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Bibliography on Forest Climates, p. 515

8 April 1957 No. 4

METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

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METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

MALCOLM RIGBY, Editor

Vol. 8 APRIL, 1957 No. 4

SPECIAL FEATURE IN THIS ISSUE

An Annotated Bibliography on Forest Climates

by
Isadore L. Dordick and Geza Thuronyi

Prepared for
U. S. Army Quartermaster Research and Development Center
Environmental Protection Division

(For complete table of contents see back cover)

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FOREWORD

Meteorological Abstracts and Bibliography is a monthly publication whose purpose is to bring to the attention of meteorologists current literature in their field and in related fields and to provide bibliographic information on various subjects, as interest demands.

Part I contains abstracts of current literature in the fields of meteorology, oceanography, etc., arranged according to the Universal Decimal Classification.

Part II of each issue comprises an annotated bibliography of important references on a special subject (usually arranged chronologically). No attempt is made to prepare exhaustive bibliographies; instead, the aim is to include a representative cross section of the various aspects of a subject.

Bibliographies published in the successive issues were:

Vol. I, 1950

1. Atmos. Pollution	2. Aerobiology	3. Cloud Physics	4. Hail
5. Tornadoes	6. Volcanic Dust	7. Climat. Changes	8. Thunderstorms
9. Icing	10. Acoust. Propagation	11. Evaporation	

Vol. II, 1951

1. Extended Forecast.	2. Long Range Forecast.	3. Soil Temp.	4. Constants, etc.
5. Clim. of Near East	6. Clim. of Middle East	7. Special Winds	8. Radar Storm Detect.
9. Condensation Trails	10. Clim. of N.E. Africa	11. Mountain Met.	

Vol. III, 1952

1. Clim. of N.W. Africa	2. Carbon Dioxide	3. Clim. of Argentina, etc.	4. Dew
5. Objective Forecast.	6. Stratus Forecast.	7. Urban Climatology	8. Clim. of C. Africa
9. Visibility	10. Glaze and Rime	11. Free Air Turbulence	

Vol. IV, 1953

1. Turbulence Theory	2. Turbulent Diffusion	3. Frost	4. Clim. of Australia, etc
5. High Level Winds	6. Winds in Stratosphere	7. Jet Stream	8. Radiation Bioclim.
9. Clim. of Pacific	10. Auroras	11. Sferics	

Vol. V, 1954

1. Oceanog. Met.	2. Clim. of S.E. Asia	3. Auroral Physics	4. Tropopause
5. Balloons	6. Numerical Forecast.	7. Radiation Data	8. Vertical Motion
9. Clim. of Arctic	10. Industrial Met.	11. Wind Waves and Swell	

Vol. VI, 1955

1. Bibliog. of Bibliog.	2. Texts & Monogr. Bibliogs.	3. Storm Surges
4. Ionospheric Prop.	5. Photochem.—Upper Atmos.	6. Cloud Physics
7. Radar Cloud Physics	8. Atmos. Nuclei (1841–1950)	9. Atmos. Nuclei (1951–1955)
10. Weather Modification	11. Cooling Power	

Vol. VII, 1956

1. Synoptic Met.-Arctic	2. Clim. of Enclosed Spaces	3. Cosmic Rays (–1952)
4. Cosmic Rays (1953–56)	5. Atmos. Radioactivity	6. Inversions
7. Snow Micromet.	8. Snow Micromet. (Suppl.)	9. Tropical Cyclones
10. Hurricane Damage	11. Tropical Cyclone Theory	

Bibliographies published this year are:

1. **Solar Relations with Weather,** Vol. 8, No. 1, Jan. 1957
2. **Night Airglow,** Vol. 8, No. 2, Feb. 1957
3. **Forecasting of Special Elements,** Vol. 8, No. 3, March 1957
4. **Forest Micrometeorology,** Vol. 8, No. 4, April 1957

Forthcoming bibliography will be:

5. **Hydrometeorological Forecasting,** Vol. 8, No. 5, May 1957

Other bibliographies in preparation are:

Actinometers	*Ozone*
Forecasting of Hydrometeorological Elements	*Radio Astronomy*
Human Bioclimatology	*Singularities*
Microwave Propagation	*Synoptic Aerology*

Part III contains a listing of reviews, translations, reprints, and the contents of important publications. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes. The December issue comprises cumulative author, subject, geographical and journal indexes.

EXPLANATIONS

Location of material: For each entry, a symbol is given for at least one library where the material may be found. The Union List of Serials (Gregory) is the source of most of the symbols used. In some cases, where no symbol has been assigned to a library, one will be devised according to the principles of the Union List.

Library symbols used frequently may be found in the following list:

DA:	U. S. Dept. of Agriculture Library, Washington, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DGS:	U. S. Geological Survey Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DN-HO:	U. S. Navy Hydrographic Office Library, Suitland, Md.
DSG:	U. S. Army Medical Library, Washington, D. C.
DSI:	Smithsonian Institution Library, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.
GB-MO:	Great Britain, Meteorological Office Library, Harrow, England.
MH-BH:	Harvard University, Blue Hill Observatory Library, Milton, Mass.

Other symbols:

*	before an entry indicates a good data source.
†	before an entry indicates a good bibliography.
§	before an entry indicates a synoptic case history study accompanied by charts

Geographic locations are in the English form rather than the form used locally, for example Moscow for Moskva.

Titles of articles or monographs are in the language of the original article unless otherwise stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet according to the Library of Congress transliteration scheme.

Abbreviations:

Titles of periodicals are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months are abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Number (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thus an entry will read as follows:

Meteorologische Rundschau, 2(5/6):146–151, May/June 1950.

This indicates that the article appeared in *Meteorologische Rundschau, Jahrgang* 2 (Vol. 2), *Heft* 5/6 (No. 5/6), *pages* 146–151, May/June 1950.

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

MAJOR GENERAL WORKS

NEW SERIALS

8.4–1 551.5(05)

Beiträge zur Physik der Atmosphäre, Frankfurt am Main, Vol. 29, No. 1, **1956.** 54 p. figs. (incl. photos), bibliogs., eqs. Irregular. Continues with same numbering, **Beiträge zur Physik der Freien Atmosphäre,** Leipzig, Vol. 1–28(1/2), **1904–1945**// (*see* 4.6–4, June 1953, *MAB*) Editors: W. Georgii and H. Koschmieder. Issued by Akademische Verlagsgesellschaft, M.B.H., Frankfurt am Main. Price: Vol. 29 (4 issues), $13.10 from Walter J. Johnson, 111 Fifth Ave., N. Y. 3, or from Academic Books Ltd., 129 Queensway, London, W. 2, Eng. Articles in German, English or French. **DWB**—Synoptic and dynamic meteorologists, as well as aerologists and upper atmospheric physicists the world over will welcome the resumption of the famous international **Beiträge zur Physik der Freien Atmosphäre** after a lapse of 10 years. The original journal was founded in 1904 by ASSMANN and HERGESELL, and was partially sponsored by the International Aerological Commission of the International Meteorological Organization (*see* 2–11, Feb. 1950, *MAB*). The new publication continues with only slight change in title and with the same volume numbering, and is issued by the same publishing house which published the earlier Beiträge as well as *Gerland's Beiträge*, *Das Wetter* and many other notable series of meteorological and geophysical publications. The only change is in the new generation which has taken over editing: W. GEORGII and H. KOSCHMIEDER, assisted by H. FLOHN, B. HAURWITZ, J. VAN MIEGHEM. Vol. 28, No. 1/2, 1945 was the last of the old series, Vol. 29, No. 1, 1956 the first of the new. This first issue contains a long tribute to RICHARD ASSMANN (1845–1918), by H. KOSCHMIEDER, an article by J. ZIEREP on lee waves in the stratosphere (in German), one by ABDUL ABDULLAH on a severe dust storm in Iraq (in English), one by H. v. TIPPELSKIRCH on Bénard convection cells (in German) and future issues will contain articles by VAN MIEGHEM (on the central circulation), W. HOLL (nuclei and ionisation), BARTHELT and RUPPERSBERG (mechanical anemometer), H. LETTAU (dynamics of equatorial atmosphere), MÜHLEISEN (atmospheric electricity), etc. Articles will be accepted in English, French or German. The quality of paper, illustrations, and printing as well as of the editing promises to be of the highest. Review by R. Bilancini in *Rivista di Meteorologia Aeronautica*, 16(3):64, July/Sept. 1956. Review by F. Steinhauser in *Archiv für Meteorologie*, Geophysik und Bioklimatologie, Ser. A, 9(3):421, 1956. Review in *Royal Meteorological Society, Quarterly Journal*, 83(355):136, Jan. 1957. (For contents, *see* this issue of *MAB*, p. 544.) *Subject Headings:* **1. Meteorological serials 2. Beiträge zur Physik der Atmosphäre 3. Serial publications. I. Georgii, W.** (*ed.*) **II. Koschmieder, H.** (*ed.*).—*M.R.*

8.4–2 55(05)(048.8)

Referativnyĭ Zhurnal, Moscow, **1954–.** (Latest available issue may be seen in Slavic Division of Library of Congress.) Issued by Institut Nauchnoĭ Informatsii of the Akademiia Nauk SSSR, in 12 sections, each separately bound and paged. Renumbers from No. 1 each year. Of special interest: **Fizika** (ed. by E. V. Shpol'skiĭ). **Geografiia** (ed. by V. V. Pokshushevskiĭ). **Astronomiia i Geodeziia** (ed. by K. F. Ogorodnikov). All 3 sections monthly. Separate author indexes for names in Latin characters and names in Cyrillic characters. **DLC**—In January 1954, the Academy of Science of the USSR began a comprehensive series of abstracting journals covering (as of 1956), 12 major fields of science and technology. Three of these journals appear twice monthly (Biology; Chemistry; and Machine Construction), and 8 appear once a month (Astronomy and Geodesy; Geography; Mathematics; Mechanics; Physics; Geology; Metallurgy; and Electronics). Biochemistry appears as a section of the

Chemistry abstracts. Material of interest to meteorologists will be found in several of the sections, notably the section on Physics, which contains about 300 abstracts a month or >3000 a year on various aspects of the **Physics of the Atmosphere;** and in the Geography section which presents 250 to 300 items a month in fields related to climatology and synoptic meteorology, hydrometeorology, oceanography, etc. Other sections which contain some pertinent material are those on Astronomy and Geodesy, Mechanics, Mathematics, Electronics and Geology, but the bulk of the periodical literature in Meteorology (and some monographic literature) will be found in the 2 sections of Physics and Geography, comprising about 10% of the total. Some repetition necessarily exists, but from the respective points of view of the major disciplines. Abstracts may be brief or long and informative with occasional reproduction of figures (weather maps, isarithm charts, etc.). Abstracts are written by specialists in each field. Cross references are supplied when necessary, and an author index appear in each issue. (For earlier abstract, *see* 6A–31, Jan. 1955, *MAB*.) *Subject Headings:* **1. Physics abstracts 2. Meteorology abstracts 3. Abstracting periodicals 4. Russian language. I. Akademiia Nauk SSSR II. Shpol'skiĭ, E. V.** (*ed.*) **III. Pokshushevskiĭ, V. V.** (*ed.*) **IV. Ogorodnikov, K. F.** (*ed.*).—*M.R.*

COLLECTED WORKS

8.4–3 551.507.362(08)

Franklin Institute, Philadelphia, **Earth satellites as research vehicles: proceedings of the Symposium held April 18, 1956 at the Institute.** Its *Monograph*, No. 2, June **1956.** figs. and bibliogs. throughout. **DWB**—This issue contains seven papers on various aspects of earth satellites and moon or space rockets by experts working with various phases of the "Project Vanguard" (for development of an earth satellite for IGY). The papers are all followed by discussions by the other members of the "Rockets-for-Peace" symposium at the Franklin Institute in Philadelphia. Speakers were HOMER NEWELL, GEORGE CLEMENT, K. A. EHRICKE, LYMAN SPITZER, JOHN DE NIKE, LOVELL LAWRENCE and R. W. PORTER, and the topics included recovery of data, orbits, biosatellites, International Geophysical Year program, etc. Papers are abstracted separately. (For contents, *see* this issue of *MAB*, p. 544.) *Subject Headings:* **1. Earth satellite symposium.**—*M.R.*

8.4–4 551.551:533.15(08)

U. S. Dugway Proving Ground, **Symposium on micrometeorology turbulent diffusion, June 28–29, 1954 at Dugway Proving Ground, Dugway, Utah.** Jan. 13, **1956.** 106 p. figs., tables, refs., eqs. **DWB**—At the three sessions devoted to problems of diffusion of gases in the atmosphere, 13 papers were presented. Five of these are given in full (see papers by Frenkeil and Katz, Tick, Barad and Davidson, Hahn, and Milby, abstracted separately), and 4 are given in abstract form (Rounds, Thayer and Whitacre, Sellers and Duckworth and Sandberg.) The main emphasis was on statistical theory of turbulent diffusion, and statistical sampling and analysis techniques for prediction of dosages at any given point away from point of origin. (For contents, *see* this issue of *MAB*, p. 557.) *Subject Headings:* **1. Turbulent diffusion symposia 2. Turbulent diffusion of gases 3. Stack effluent diffusion.**—*M.R.*

8.4–5 551.585.53:06

†White, Gilbert F. (*ed.*), **The future of arid lands. Papers and recommendations from the International Arid Lands Meetings (Albuquerque, N. M., 1955).** *American Association for the Advancement of Science, Wash., D. C., Publication*, No. 43, **1956.** 464 p. 49 figs. (incl. photos), numerous bibliogs. Price: $6.75. **DLC**—This volume contains the various papers presented at the International Arid Lands Meetings held at Socorro, N. M., April 16–May 21, 1955. The preface, written by the editor, contains an account of the history and purpose of the conference. In addition to the papers, the volume contains the recommendations of the conference, lists of the committees for the meetings and some of the members and a list of the participants. A good index is provided. The papers of meteorological and climatological interest are abstracted separately. (For contents, *see* this issue of *MAB*, p. 558.) *Subject Headings:* **1. Arid zone research 2. Arid zone conferences. I. New Mexico. Univ. II. UNESCO III. International Arid Lands Meetings, Albuquerque, New Mexico, April 26–May 4, 1955 IV. American Association for the Advancement of Science.**—*I.L.D.*

8.4–6 551.507.362(08)

†Van Allen, James A. (*ed.*), **Scientific uses of earth satellites.** Ann Arbor, Univ. of Michigan Press, **1956.** 316 p. figs., tables, bibliogs. throughout. Price: $10.00. **DWB**—A compilation of 33 of the papers presented at the Upper Atmosphere Rocket Research Panel meeting at Ann Arbor, Mich. on Jan. 26–27, 1956. The papers are devoted to detailed, specific proposals for use of satellites in measuring temperature, density, air-drag, pressure, radiative heat transfer, visibility, hydrogen in space; UV, auroral and cosmic ray flux; geomagnetic field, ionospheric structure, meteoric drag, interplanetary dust, radio propagation, etc., as well as the performance of the satellite itself. The papers are listed in Pt. III of this issue of *MAB* (*see* p. 557) and will be abstracted separately. *Subject Headings:* **1. Satellite observatory conferences 2. Satellite uses.**—*M.R.*

TEXTBOOKS

See also: **Popular treatise on met.** (Hsieh), 8.4–17.

8.4–7 551.509(02)

§†Petterssen, Sverre (*Prof. Meteorology, Chic. Univ.*), **Weather analysis and forecasting, Vol. 2, Weather and weather systems.** 2d ed. N. Y., McGraw-Hill, **1956.** 266 p. numerous figs., tables, eqs. Bibliog. at end of each Ch. 7 plates (fold.) in pocket. **DLC.** Review of Vol. 1–2 by Jerome Spar, in *Science*, Wash., D. C., 124(3225):728–729, Oct. 19, **1956. DLC**—The first volume of the completely revised second edition of PETTERSSEN's textbook on synoptic analysis and forecasting covered in 19 chapters the theory and some applications of equations of motion (and derived equations) to analysis of pressure, temperature and wind fields and to numerical prediction. This second volume (chapters 20–28) covers the more direct applications to forecasting: 20) sources of energy and transformation of air masses; 21) thermodynamical relations; 22) cloud and precipitation physics; 23) quantitative precipitation forecasting; 24) fog and stratus; 25) convective clouds and weather; 26) weather systems; 27) local forecast studies, and 28) synoptic climatology used in weather prediction. Ch. 20 borrows heavily from charts of W. C. JACOBS (1951) on energy exchange between ocean and atmosphere; chapter 26 from BERGERON's recent attempts to make weather charts more representative of weather conditions than of mathematically unrealistic models of pressure systems; chapter 27 on GRINGORTEN's (and others) ideas of objective aids to forecasting, and chapter 28 (by Tom Malone) on the ideas of synoptic dynamic-statistical climatology of JACOBS, WADSWORTH, MALONE and others. Finally, Ch. 23 (by J. C. Thompson) goes into the numerical prediction of precipitation from vertical motion data derived from upper air soundings. This volume taken by itself is a contribution to the textbook literature on practical analyses and forecasting. Taken together with the first volume (which is twice as big) it is a formidable tool for the teacher, student, or analyst. (For abstract on Vol. 1, *see* 7.8–4, Aug. 1956, *MAB*.) *Subject Headings:* **1. Analysis and forecasting textbooks 2. Objective forecasting 3. Numerical rainfall prediction 4. Synoptic climatology. I. Jacobs, W. C. II. Thompson, J. C. III. Malone, T. F.**—*M.R.*

8.4–8 551.5(02)

§Berg, Hellmut, **Atmosphäre und Wetter; eine Einführung in die Meteorologie.** [Atmosphere and weather: an introduction to meteorology.] Stuttgart, Humboldt, **1953.** 311 p. 74 figs., numerous tables and eqs. *Sammlung Die Universität*, Bd. 35. **DLC**—An elementary but authoritative text on meteorology written from the standpoint of a synoptic meteorologist. The several chapters are concerned with: 1) Objectives of the Science of Meteorology; 2) History and requirements of observations and networks; 3) Content of observations; 4) Thermodynamic processes; 5) Composition of atmosphere; 6) Radiation from sun, sky and earth; 7) Annual and diurnal variations in temperature, vapor and wind; 8) Structure and composition of upper atmosphere; 9) Clouds and precipitation formation; 10) Synoptic meteorology; 11) Forecasts; 12) Special phenomena (thunderstorms, hurricanes, tornados, föhn winds, mountain and valley winds, land and sea breezes); 13) General circulation; 14) Solar influences on weather. The chapter on forecasting contains a number of analyzed case histories for America and Europe. The text is full of schematic charts and diagrams and a subject index

is appended. *Subject Headings:* **1. General meteorology textbooks 2. History of meteorology.** —*M.R.*

8.4–9 551.5:63(02)

Vitkevich, Vitol'd Ignat'evich, **Sel'skokhoziaĭstvennaia meteorologiia.** [Agricultural meteorology.] Moscow, Gos. Izdat. Sel'skokhoziaistvennoĭ Literatury, **1955.** 279 p. 82 figs. (incl. photos), 48 tables, foot-refs. **DWB**—This textbook of agricultural meteorology is characterized by an experimental rather than theoretical approach to meteorological principles and is designed to acquaint agriculture students with the principles of meteorology. The contents are as follows: definitions, content and history of agricultural meteorology, the fundamental physical properties of the atmosphere and the instruments for measuring them; solar radiation , its properties and measurement; the heat regime of the soil, its measurement; soil moisture, hydrometeors and their measurement; heat balance of the atmosphere; wind and its measurement; drought (atmospheric and soil drought) and sukhovei (dry winds); frosts and methods for their prevention; weather forecasting and atmospheric processes (air masses, fronts, vertical air motion, etc.); climates of the U.S.S.R.; and the principles of complex climatology and its significance in agricultural meteorology. The text is accompanied by numerous diagrams of the apparatus, by statistical weather charts and also by photographs. *Subject Heading:* **1. Agrometeorology textbooks.**—*I.L.D.*

8.4–10 551.5:656.7(02)

†Weems, Philip Van Horn, **Air navigation.** 4th ed. Annapolis, Md., Weems System of Navigation, **1955.** 473 p. forms, 192 figs. (incl. photos.), tables, charts, bibliog. p. 459–463. **DWB**—A thorough and standard text on all aspects of air navigation. Under Dead Reckoning in Ch. V the theoretical effect of winds is considered, in Ch. VI the instruments used to determine altitude and wind are discussed, and in Ch. VII the application of wind and pressure (altitude) data to actual navigation by dead reckoning is treated, with examples. Ch. XI (p. 220–248) is entirely devoted to pressure pattern flying (theory, the radio altimeter, minimal flight paths, drift computation, single heading flight, measuring wind on a synoptic chart, flight forecast D-value maps, and examples). Navigation in polar regions and problems encountered there are treated in Ch. XV. Lack of weather reports, refraction (for visual or celestial navigation) and other problems are important. Meteorological problems enter into the examination section. *Subject Headings:* **1. Air navigation meteorology 2. Air navigation textbooks.**—*M.R.*

8.4–11 551.5(02)

Yamamoto, Gi-ichi, **Kisho-gaku Gairon.** [General meteorology.] Tokyo, Asakura Book Co., Ltd., **1950.** 235 p. 132 figs., 18 tables, bibliog. p. 225–226. In Japanese. (Orientalia, Japanese, uncat.) **DLC**—Textbook on meteorology for junior college in 10 chapters: introduction, 1) atmosphere, 2) radiation, 3) temperature-pressure-humidity, 4) thermodynamics, 5) condensation phenomena, 6) atmospheric motion, 7) general circulation of the atmosphere, 8) air mass and front, 9) atmospheric disturbances, 10) weather forecasting. *Subject Heading:* **1. Meteorology textbooks.**—*H. Arakawa.*

8.4–12 551.5:63(02)

*Gol'tsov, M. M.; Maksimov, S. A. and Iaroshevskiĭ, V. A., **Praktische Agrarmeteorologie.** [Practical agricultural meteorology.] Berlin, Deutscher Bauernverlag, **1955.** 310 p. 47 figs., 85 tables, 24 refs., 22 eqs. **DLC.** Translation from original Russian of their **Prakticheskaia agrometeorologiia,** pub. Leningrad, Gidrometizdat., **1952.**—This textbook and manual of applied agricultural meteorology is strictly practical in its approach to the study and application of agrometeorological principles and techniques to agricultural practice. It is provided with exercises and examples outlining the procedures in setting up experiments, in making observations and in the interpretation of the results obtained. The book consists of two parts: 1) Agrometeorological observations and 2) Agrometeorological service. The former includes: procedures for setting up experimental field plots, methods for determining soil moisture content and calculating amount of productive moisture, determination of the moisture characteristics of soils such as volume weight of soil, calculation of total porosity and maximum water capacity in percent of absolute dry soil, etc., observation and calculation of

evaporation; and observation on growth, development and condition of agricultural crops, natural meadows and natural pastures. Pt. 2 deals with the composition of agrometeorological reports, phenological forecasts, forecasts on reserve of productive moisture at the beginning of the vegetation period, and on the reserve of productive moisture at the start of the vegetation periods in fields under crops, and night frost warning on the basis of local observations. The procedures are described in great detail with the aid of numerous diagrams and the various types of apparatus and instruments are illustrated; samples of data sheets, calculations and actual results obtained are presented. *Subject Headings:* **1. Agrometeorology textbooks. I. Freyse, K.** (*ed.*).—*I.L.D.*

TRANSLATIONS

8.4–13 532.5:551.511

Bjerknes, Vilhelm F. K.; Bjerknes, Jakob; Solberg, Halvor S. and Bergeron, Tor, **Physical hydrodynamics with application to dynamic meteorology.** [Translation by Paul C. Kangieser of Ch. 1, Pt. 1, **Scalars, vector, tensors,** and Ch. 2, **Kinematics of the continuum** of the original German, **Physikalische Hydrodynamik,** pub. Berlin, Julius Springer, **1933.**] Trans. **1946.** 49 p. numerous eqs. Typescript. **DWB**—This translation of the first part of Ch. 1 of Bjerknes, Solberg and Bergeron's famous book on physical hydrodynamics, gives the detailed developments or solutions of the higher mathematics (scalars, vectors and tensors) which is fundamental to the treatment of problems in air flow, convergence, divergence, vorticity, solenoidal fields, etc. Operations with three vectors, linear vector functions, dyads, combined differential and integral operations, the potential tensor, Gibbs vector and tensor algebra, and tensor analysis, respectively. In Ch. 2 the Kinematics of the continuum are treated. (For abstract on original, *see* 4A–19, Jan. and 4G–2, July 1953, *MAB.*) *Subject Headings:* **1. Hydrodynamics 2. Kinematics 3. Dynamic meteorology 4. Vector analysis. I. Kangieser, Paul C.** (*trans.*).—*M.R.*

MANUALS

See also: **Marine forecasting** (Gt. Britain), 8.4–65; **Ceiling balloon equipment** (Canada. Met. Div.), 8.4–106.

8.4–14 551.509 551.515.2

*§†Palmer, C. E.; Wise, C. W.; Stempson, L. J. and Duncan, G. H., **The practical aspect of tropical meteorology.** *U. S. Air Force. Cambridge Research Center, Air Force Surveys in Geophysics,* No. 76, Sept. **1955.** 195 p. numerous figs. and tables, 42 refs. **DWB, DLC.** Also as: *U. S. Air Weather Service, Manual* 105-48, September **1955.** 195 p. numerous figs., tables, 42 refs. **DWB.** Also issued as California. Univ. Institute of Geophysics. Oahu Research Center, Contract AF 19(604)-546, Special Report, No. 2, March **1955.** 195 p. numerous tables and figs., bibliog. p. 193–195.—The essentials of tropical meteorology and climatology are outlined and illustrated for the benefit of the analyst or forecaster who finds himself for the first time in the tropics—broadly defined as the region between the semi-permanent anticyclones and the atmosphere above this region, whether 15° or 45° from the equator. The use of climatology, the climatology of the field of motion and of the field of composition, analysis and evaluation of pressure, visibility, cloud, precipitation, temperature, dew point, upper air temperature and winds and surface wind data; wind analysis; composition of tropical clouds, correlation of wind and weather; and last but not least (p. 157–184) tropical cyclones [life cycle, structure statistics, formation and intensification, detection and location, movement, orographic effects and state of sea (storm tides and swells)]. Manual contains many schematic and representative diagrams, charts, soundings, cloud sketches and wind analyses. (*Same item as* 7I–168, Sept. 1956, *MAB.*) *Subject Headings:* **1. Tropical meteorology manuals 2. Tropical cyclones.**—*M.R.*

POPULAR METEOROLOGY

8.4–15 551.5(023)

Beliakov, Mikhail Vasil'evich, **Atmosfera.** [The atmosphere]. Moscow, Izd-vo Tekhniko-Teoret. Litry., **1955.** 62 p. 27 figs. *Nauchno-Populiarnaia Biblioteka.* **DLC**—A popular brochure (150,000 copies) giving the basic facts concerning the physical and chemical

properties of the atmosphere (pressure, temperature, water vapor, wind, snow, lightning, storms, structure, composition, outer atmosphere, etc.) and some sketchy accounts of hurricanes, floods, tornadoes, tidal waves and other dramatic features of world weather. Illustrations are mostly schematic drawings. *Subject Heading:* **1. Popular meteorology pamphlets.** —*M.R.*

8.4–16 551.5(023)

Glebov, P. A., **Nauka o pogode.** [Science of weather.] Leningrad, Gidromet. Izdat., **1955.** 110 p. 39 figs. (incl. photos). *Naucho-Populiarnaia Biblioteka.* **DLC**—A popular textbook giving information on the structure of the atmosphere, and the physical processes occurring in it. The author discusses weather and methods of observing and forecasting. The 7 chapters of the book deal consecutively with: atmosphere, its structure and properties; the radiant energy of the sun; heat condition of soil and waters; air temperature; water vapor and its transformation in the atmosphere; winds and air currents; the last chapter, entitled **Meteorology in the service of national economy,** deals with the object and organization of the meteorological service, methods of weather forecasting, and gives a survey of the gradual development of science of weather. The book is intended for nonprofessional readers interested in meteorology; for high school students and hydro-meteorological observers. *Subject Headings:* **1. Popular meteorology 2. Meteorology textbooks.**—*A.M.P.*

8.4–17 551.5(023)

Hsieh, Chi-hsün, **Ch'i hsiang hsüeh chiang hua.** [Popular treatise on meteorology.] Taipei, [Chinese Cultural Publishing Committee], **1952.** 208 p. 53 figs., photos. In Chinese. **DLC**—A popular text-book on meteorology. Ch. 1. Introduction, 2. Meteorological observations, 3. Atmosphere, 4. Water cycle in the atmosphere, 5. Thermal change in the atmosphere, 6. Air currents, 7. Air masses and surfaces of discontinuity, 8. Cyclones and anticyclones, 9. Weather analysis, 10. Weather forecasting, 11. Climate, and 12. Conclusion. *Subject Headings:* **1. Meteorology textbooks 2. Popular meteorology.**—*H. Arakawa.*

8.4–18 551.46

Malkus, Alida Sims, **The sea and its rivers.** Illus. by the author. Garden City, N. Y., Doubleday, **1956.** 221 p. 33 refs. **DLC**—Semi-popular treatment of the oceanography and modern methods of studying or exploring the oceans, the Gulf Stream and the various forms of life in the oceans. The origin of the oceans is described in Chap. 4 (p. 51–57), currents, trade winds and the Gulf Stream in Chap. 6, 7, and 8 (p. 67–103), and waves, tides and ice in Chap. 9 (p. 104–116). The work is based to a great extent on research and expeditions conducted by members of the staff of the Woods Hole Oceanographic Institute. The many drawings make the book vividly interesting. *Subject Heading:* **1. Popular oceanography books.**—*M.R.*

8.4–19 551.509(023)

Valmar, René, **Pour prévoir le temps.** [Weather forecasting.] Paris, Éditions de Montsouris, **1953.** 158 p. 46 figs., 4 plates. *Collection Rustica.* **DLC**—This pocket edition for popular information gives elements of forecasting from synoptic charts and from local indications, as well as information on sun, moon, planets and stars, the atmosphere, long range forecasting, weather proverbs and lore. Chapters on temperature, humidity, wind, cloud, fog, rain, snow, hail, dew, frost, rime, glaze, thunderstorms, gales, lightning, etc. emphasize agricultural interests. *Subject Headings:* **1. General meteorology 2. Weather forecasting 3. Popular science books 4. Weather lore.**—*M.R.*

MONOGRAPHS AND OUTSTANDING PAPERS

See also: **Structure of atmos. turbulence near ground** (Sakagame), 8.4–223; **Hail observations, Denver** (Beckwith); 4.4–279; **Polarization of high frequency radio waves** (Landmark), 8.4–341.

8.4–20 551.513.1:551.515

Fleagle, Robert G., **On the dynamics of the general circulation.** *Royal Meteorological Society, Quarterly Journal,* 83(355):1–20, Jan. **1957.** 7 figs., 15 refs., 40 eqs. **DWB**—The

dominant features of large-scale atmospheric motion emerge from a relatively simple treatment of the hydrodynamic equations, thus providing clear, intuitive understanding of the relation between cause and effect in the general circulation. The analysis is made possible by applying the perturbation equations to a sloping stream surface located in the middle troposphere. For reasonable values of the arbitrary parameters, the results show that baroclinic disturbances are unstable poleward of a critical latitude, roughly 35°, and that the preferred number of such unstable disturbances at any one time decreases from about 10 at 45° to 2 at 80°. Greatest intensity occurs at about 60°. Jet streams must form close to the critical latitude and, in the case of long disturbances, at higher latitudes. Anticyclonic shear has a stabilizing influence, so that the normal velocity distribution in middle latitudes offers considerable resistance to penetration of disturbances to low latitudes. Below the critical latitude unstable disturbances are possible only in relatively small areas where the hydrostatic stability is nearly zero. Growth of these disturbances is favoured by anticyclonic shear, as well as by baroclinicity and by high latitude. Disturbances of maximum rate of growth are practically non-dispersive so that their growth depends mostly on available potential energy. If sufficient energy is available, the identity of individual disturbances can be maintained over extended time periods. Wave speed relative to the zonal current exhibits a maximum positive value at a high latitude. *Subject Headings:* **1. Atmospheric circulation dynamics 2. Perturbation equations.**—*Author's abstract.*

8.4–21 551.510.42

†Air Pollution Foundation, Los Angeles, **Second Technical Progress Report.** Its *Report*, 1(12), Nov. 1, **1955.** 143 p. figs., tables, refs., bibliog. at end of each ch. **DWB**—Three ways of pollution control are suggested: 1) control of meteorological or topographic conditions (impracticable), 2) control of all pollutants, and 3) control of harmful pollutants. The latter are discussed with respect to the Los Angeles area. SO_2 is not present to any extent as plant injury is not the type caused by SO_2. Organic compounds, reduction by NO_2 to produce O_3, auto exhaust, effect of high concentrations, trend in visibility (1932–54), which reached peak in 1947 and has been reduced 25% by 1954; trend in oxidant (no data before Aug. 1954), time variations in inversion heights for each day (monthly graphs), aerometric survey Aug.–Nov. 1954; air monitoring instruments (ozone radiometers), four-in-one analyzer for oxidants, NO_2 and N_2O; CO_2 recorder (hydrocarbon recorder); air monitoring study in Pasadena July–Nov. 1955; aerosol studies; microwave spectroscopy are treated in the first part **"What is smog?"** In Pt. II, **How is smog formed?**, work by HAAGEN-SMIT and FOX on O_3 formation from hydrocarbons, work at Franklin Institute, Armour Research Foundation and Stanford Research Institute on chemical action by sunlight, etc., are reviewed. In Pt. III, **What are the sources?,** a map of industrial sources and traffic density in Los Angeles shows areas of high concentration of pollutants and data show concentration on a day with average inversion height of 1650 ft, trajectories of pollutants derived from air tracer (fluorescent cloud) studies in 1954 and 1955 are shown on several charts for days with high and low concentration for Los Angeles and Pasadena. Pt. IV goes into the control aspects for rubbish and incinerator, exhaust gas, industrial particulate matter, SO_2, hydrocarbons, etc. *Subject Headings:* **1. Atmospheric pollution 2. Atmospheric pollution monographs 3. Smog 4. Atmospheric pollution control 5. Los Angeles. I. Faith, W. L. II. Hitchcock, L. B. III. Neiburger, M.** —*M.R.*

8.4–22 551.542:551.506(261.4)

*Germany. Deutscher Wetterdienst. Forschungsabteilung, **Monthly means of sea level pressure for a grid of intersections of latitude and longitude over the North Atlantic Ocean from December 1880 to November 1899.** Contract AF 61(514)-646-C, Scientific Report No. 1, July **1955.** 164 p. entirely tables. **DWB**—Chart shows grid from 100°W to 80°E and from 10°N to 80°N (Eastern North America, Atlantic Ocean, Europe, Western Siberia and North Africa). Data were obtained from daily synoptic charts of the Deutsche Seewarte (1880–1899) and from the International Bulletin of the U. S. Signal Office. Values are given in millibars, with three figures (1 decimal place) for each separate month from Dec. 1880 to Nov. 1899, for winter of each year, Jan. and Feb., July and Aug., June, July and Aug., and for whole year (1881–1899) and for each 5° of lat. and 10° of long. Most grid points in network were

complete for period. *Subject Headings:* **1. Monthly mean sea level pressure data 2. Northern Hemisphere pressure data 3. International Synoptic Bulletin 4. North Atlantic.**—*M.R.*

8.4–23 551.513

*†Klug, Werner, **Der Mechanismus der Steuerung von hochreichenden Zyklonen.** [Mechanism of the steering of deep cyclones.] *Berlin. Freie Universität. Institut für Meteorologie und Geophysik, Meteorologische Abhandlungen*, 3(2), **1956.** 42 p. 21 figs., 5 tables, 16+refs., 3 eqs. **DWB**—The principle of "steering," defined by VON FICKER (1938) as the condition whereby a pressure system is propagated by external rather than internal forces, is examined on the basis of literature (SHAW, 1918, SCHERESCHEVSKY and WEHRLE, 1923 . . . SCHERHAG, 1948), and by analysis of 32 cases of cyclones reaching to the tropopause or higher. The tangential and radial wind components and resultant wind vectors to ca. 1000 km at 500, 700 and 850 mb are calculated and represented on polar diagrams, and compared with similar diagrams for tropical cyclones taken from JORDAN (1952). This comparison of the two types of cyclones shows the greatest pressure gradient and speeds near the center of a tropical cyclone but at a greater distance from the center of intratropical cyclones. In both types the greatest tangential velocities are found at about 120° from the direction of movement. *Subject Headings:* **1. Steering of deep cyclones 2. Tropospheric steering.**—*M.R.*

8.4–24 551.501.4:551.521.1:711

†Pleijl, Gunnar, **Computation of natural radiation in architecture and town planning.** Stockholm, **1954.** Thesis, (Ph.D. in Technology) Tekniska Högskola, Stockholm. 143 p. 59 figs., 56 tables, 101 refs. **DWB**—This monograph is concerned with the presentation of a universally appliable method for calculating solar and sky radiation with special reference to the requirements of architects and town planners. Beginning with a general discussion of the physical and chemical properties of sun and sky radiation, its transmission through the atmosphere, the concept of luminous efficiency and the measurement of heat, light and erythmal radiation the author then proceeds to a detailed treatment of the calculations of various aspects of radiation. This includes: 1) meteorological methods of calculation of solar radiation and diffuse radiation for clear and cloudy skies, solar line function of clarity (for Helsinki), solar line function of the sunshine autograph, etc.; 2) calculation of illumination from the sun and from the sky separately and global illuminations in Helsinki and Stockholm; and 3) calculations of erythmal radiation. A graphical method for the calculation of the duration of solar radiation is presented; it involves the use of the solar chart, screen card and the globoscope; their use is illustrated. In addition, tables and nomograms for the calculation of solar and of sky radiation and examples illustrating the use of the screen figure combined with solar chart and radiation cards and of globoscope figures combined with solar chart and radiation cards are presented. The radiation data contained in this monograph pertain primarily to Helsinki. *Subject Headings:* **1. Solar radiation calculations 2. Architecture 3. Town planning 4. Radiation data 5. Helsinki, Finland.**—*I.L.D.*

8.4–25 551.524.7(7, 988):551.508.822 551.557(7, 988):551.508.822

*Lowenthal, M. and Arnold, A., **Signal Corps-Air Weather Service high-altitude radiosonde flights, Aug. 1954.** *U. S. Signal Corps Engineering Labs., Ft. Monmouth, N. J., Technical Memorandum*, M-1711, Nov. 14, **1955.** 21 p. 12 figs., 5+6 tables, 9 refs. **DWB**—Upper air temperatures and winds for Belmar, N. J., Patrick Air Force Base, Fla. (28°14′N, 80°36′W), Goose Bay, Labrador (53°20′N, 60°25′W) and Narssarssciak, Greenland (61°11′N, 45°25′W) to 4 mb level (>120,000 ft) in Aug. 1954 are tabulated and presented graphically. Mean temperature, latitudinal variation, effect of tropopause, range of temperature, standard deviation, 24 and 48 hr temperature change, mean zonal winds, scalar winds, steadiness, s.d. of vector winds, etc. are considered. The observations were made with experimental high-altitude balloons with special radiosondes developed by the Signal Corps. A hypsometer was used for pressure, a motor for switching, and the balloons (6000 g) had a free lift from 1500 to 2500 g of He, and an ascension rate of 1000 ft/min. The mean cross section shows an easterly jet over Florida at 115,000 ft and a westerly jet at Belmar at 40,000 ft. Above 90,000 ft the minimum temperature at any level is independent of latitude, but the range of

mean temperatures at any given level decreases to a minimum at 110,000 ft. *Subject Headings:* **1. Upper air temperatures 2. Upper air winds 3. High altitude radiosonde flights 4. North America 5. Greenland.**—*M.R.*

8.4–26 551.582(773)

§*Page, John L. (*Illinois Univ.*), **Climate of Illinois: summary and analysis of long-time weather records.** *Illinois. Agricultural Experiment Station, Bulletin*, No. 532:96–364, April 1949. 43 figs., 14 tables. **DWB**—An excellent study of the climate of Illinois from the practical point of view is found on p. 97–148. The analysis and tables constitute a revision of their *Bulletin* 208, climate of Illinois, published in 1918, to include data through 1946. Storms, cold waves (illustrated by synoptic charts), air masses, climatic controls, temperature, precipitation, trends or fluctuations in temperature and precipitation over 100 years by year and by season, frost and growing season, dependability of precipitation, driest and wettest years, snowfall, etc. are discussed and illustrated by integrated or analytical charts and tables showing time and space variations over the state, or for seasons, months or years. *Subject Headings:* **1. Climate of Illinois 2. Climatic data for Illinois 3. Illinois.** —*M.R.*

8.4–27 551.573:016

†Thornthwaite, C. W. and Mather, J. R., **The water balance.** *Drexel Institute of Technology. Laboratory of Climatology, Centerton, N. J., Publications in Climatology*, 8(1): Contract AF 19(604)-1306, Scientific Report, No. 1; Contract Nonr-1617(00), Task NR 389-101, Technical Report, No. 1, **1955.** 104 p. figs., tables, bibliog. p. 77–89. **DWB**—The studies made by the authors and their colleagues during the past decade on the problem of evapotranspiration and the water balance of land or crops are thoroughly reviewed in this monograph, which is largely made up of portions of previous reports. The first part deals with the subject of evapotranspiration and its complexities (instruments and method of calculation to compensate for inadequacies of present measurement techniques). The second part deals with applications (moisture deficit, moisture surplus, moisture storage, and moisture indices). Third part consists of a very extensive bibliography of articles from all parts of the world, on evapotranspiration. Much data and many charts are included. *Subject Headings:* **1. Potential evapotranspiration 2. Bibliography on evapotranspiration.**—*M.R.*

GENERAL GEOPHYSICS AND METEOROLOGY

EXPEDITIONS—ARCTIC, ANTARCTIC RESEARCH

See also: **Polar airline navigation** (Pedersen), 8.4–62; **O'Neill Project, Neb. Pt. 1** (Lettau), 8.4–92; **O'Neill Project, Pt. 2** (Lettau), 8.4–93; **Flowers in Arctic** (Platt), 8.4–301; **Contribution to aerology of Arctic stratosphere** (Warnecke), 8.4–315; **Ionospheric conditions in southern auroral zone** (Shapley), 8.4–336.

8.4–28 551.5:551.43(546)

*Flohn, Hermann, **Zur meteorologie des Nanga Parbat.** [Meteorology of Nanga Parbat.] (In: **Nanga Parbat, 1953.** pub. Munich, Verlag I. F. Lehmann, [1954?]. p. 171–192. 10 tables.) **DWB**—A detailed synoptic and climatological analysis of the 3 times daily observations of pressure, temperature, precipitation, wind, cloudiness, cloud direction, etc. made on Nanga Parbat (35°18′N, 74°36′E) during the expedition of May–Sept. 1953. Observations were made at several camps located at 3960–5320 m, with occasional observations at 6100 and 6700 m. Records are compared with those at Gilgit (1490 m), Dras, (3066 m), Skardu, (2288 m) and Leh (3514 m) as well as at Karakoram (4500 m), at Nanga Parbat in 1934, and at Lhasa (4 years). The purpose of the analysis is to give a clear 3-dimensional picture of the atmosphere and weather over this little explored alpine region, as well as conditions on the several expeditions. *Subject Headings:* **1. Mountain meteorology 2. Climate of Nanga Parbat 3. Nanga Parbat Expedition, 1953 4. Nanga Parbat, Kashmir.**—*M.R.*

8.4–29 551.311.184(268)

Czeppe, Zdisław, **Nowe odkrycia arktyczne.** [New Arctic discoveries.] *Czasopismo Geograficzne*, Warsaw, 26(3):271–272, **1955.** refs. **DLC**—Studies of the origin, size, drift and depth of the ice islands T1, T2 and T3, the first of which was discovered at (86°N, 160°E) in Aug. 1946 by an American flier patrolling the Arctic waters, provided much new and important information on prevailing currents and ice conditions in the Arctic. It has been found that they are torn off parts of Ellesmere Ice Barrier and that due to the depth of their draught, they drift in a direction contrary to the movement of ice pack carried by surface currents. Further observations led to the discovery of a circular flow of Canadian Arctic water from the northern shores of Greenland along Ellesmere coast to Pt. Barrow and further north and returning to Greenland through the pole. There are some arms in S and SE directions. Observations of ice island drifts along the Siberian coast, the "Fram" and "Jeanette" drifts, the drifts of logs from Siberian rivers and of hydrographic bottles released in Soviet waters indicate the presence of Siberian circular current in counter-clockwise direction. Both of the currents pass jointly through the pole and their branches utilize the passage between Greenland and Spitsbergen; their cycle is of about 5 years. Latest Soviet studies have confirmed the existence of both these currents. *Subject Headings:* **1. Arctic ice islands 2. Arctic ice movement 3. Arctic ocean currents 4. Arctic.**—*A.M.P.*

8.4–30 551.506.5(988)

*Expéditions Polaires Françaises. Missions Paul-Émile Victor, **Les observations météorologiques de la Station Française du Groenland 70°55′93″N—40°38′22″W—altitude 2993 m.: conditions atmosphériques en surface du 5 septembre 1949 au 20 juin 1950.** [Meteorological observations at the French Greenland Station: surface atmospheric conditions, Sept. 5, 1949–June 20, 1950.] Its *Expéditions Arctiques, Résultats Scientifiques, Ser. N.V. (Météorologie)*, [unnumbered report], Paris, **1954.** 2 v. Vol. 1, **Relevés quotidiens.** [Daily observations.] 289 p. almost entirely charts. Vol. 2, **Études et commentaires sur les observations.** [Studies and comments on the observations.] 167 p. numerous figs., tables, and charts. **DWB**—The first volume consists of beautifully drafted graphs of the meteorological elements for each day of the winter (over 9 months) spent near Eismitte at the station of the central Greenland Ice Cap manned by Michel Bouché, Pierre Chavy and Réné Garcia. Conditions were extremely rugged, a minimum temperature −65°C and a wind of 120 km/h being recorded. The graphs show for the entire 24 hours of each day the pressure, temperature, vertical temperature gradient from ground to 10 m., the winds, winds aloft, cloud amount, type, height, thickness and movement (in color), hydrometeors and visibility. Some of the cloud formations were extremely complex. The second volume gives extensive notes, statistics, summaries, graphs (based on 3-hourly observations) month by month. *Subject Headings:* **1. Expeditionary climatic data 2. French Greenland Expedition, 1949–1950 3. Eismitte, Greenland.**—*M.R.*

8.4–31 551.509.21(99)

*Le Quinio, Robert, **Cartes météorologiques de l'Hémisphere Sud entre 30°S et 70°S—70°E et 180°: cartes quotidiennes des pressions du 1er janvier 1951 au 31 decembre 1951, 06 00 TU.** [Meteorological charts of the Southern Hemisphere between 30°S and 70°S (and) 70°E and 180°: daily pressure charts, Jan. 1, 1951–Dec. 31, 1951, 06 00 TU.] *Expéditions Polaires Françaises, Expéditions Antartiques, Résultats Scientifiques, Ser. S.V. (Météorologie)*, [unnumbered report] Paris, **1955.** 6 p. numerous charts. **DWB**—An excellent series of daily surface weather maps for the region from Australia to the South Pole for the year 1951. The charts are intended to be an aid to the study of microseisms observed during 1951 by the French Expedition to Adélie Land. Fronts could not be included as data were too sparse. *Subject Headings:* **1. Antarctic daily weather maps 2. Southern Hemisphere weather maps 3. French Antarctic Expedition, 1951 4. Adélie Land.**—*M.R.*

8.4–32 551.5:061.6(99)

Wexler, H. and Rubin, Morton J., **Antarctic climatology and meteorology.** *American Geophysical Union, Geophysical Monograph*, No. 1:36–43, **1956.** 5 figs., table, 18 refs. **DLC**—The Antarctic affords an opportunity to investigate a wide range of meteorological problems under conditions not found elsewhere on earth. These problems include the examination of

the thermal, mass, and mobile structure of an atmosphere cut off both from direct solar energy for many months and, in contrast to its Arctic Ocean counterpart, from conduction of appreciable heat from below. The sharp distinction between the troposphere and the stratosphere, so marked elsewhere, is believed to vanish during the polar night over Antarctica. Another problem is whether the Antarctic troposphere's flow pattern is dominated by the mid-latitude planetary wave system moving like spokes of a wheel around the Pole as appears to be the case in the Arctic, or by waves moving radially outward from the interior of the Continent, as suggested by earlier meteorological observations. A smaller-scale, but important problem, especially for field and aircraft parties, is the drainage, blocking, and deflective influence of mountains and hills on producing local circulations and blizzardy winds up to hurricane force. The existence of a uniformly thermal and flat snow surface, such as is found for hundreds of miles over the Ross Ice Shelf, will provide an unexcelled natural laboratory to study atmospheric turbulence and energy exchange between atmosphere and snow surface. The incoming and outgoing radiation fluxes, the albedo of the snow surface, the polar white-out, and the variations of ozone and other gases are further examples of problems in polar geophysics which will be investigated during the forthcoming International Geophysical Year. *Subject Headings:* **1. Meteorological research projects 2. Antarctic meteorology 3. International Geophysical Year, 1957–1958.**—*Authors' abstract.*

IGY, WMO, UN

See also: **Earth satellite symposium** (Franklin Inst.), 8.4–3; **Canada and WMO,** 8.4–41.

8.4–33 551.5:06.024

Möller, F., **Das Internationale Geophysikaliche Jahr. I. Meteorologische Forschungsaufgaben: Allgemeine Zirkulation der Atmosphäre und Wärmehaushalt.** [The I.G.Y., Pt. 1, Problems of meteorological investigation: General circulation of the atmosphere and heat economy.] *Umschau,* 57(1):14–16, Jan. 1, **1957.** 2 figs. **DLC**—The horizontal general circulation is well known, but not the vertical structure of its members, and gaps in the radiosonde network need to be filled; in the Antarctic 20 stations are planned. The U. S. will construct N. Hemisphere daily charts (20–90°N) for several levels, S. Africa for the S. Hemisphere and Germany for 30°N–30°S. These can be used e.g. for studies of meridional turbulent heat transport and, through considerations of continuity, of vertical movement. The heat transfer will also be studied directly in Germany, by radiation measurements at surface stations. For the upper atmosphere W. Pohl has designed a radiosonde night radiation balance meter. Other terms are latent heat of condensation, electrical energy, etc. *Subject Heading:* **1. International Geophysical Year Meteorological program.**—*C.E.P.B.*

8.4–34 551.5:550.3:061.3 551.501.9:550.3

Van Mieghem, J., **International Geophysical Year 1957–58: meteorological programme.** *World Meteorological Organization, WMO Bulletin,* 5(1):2–10, Jan. **1956.** 2 photos. **DWB**—A discussion of the purposes, program in general, and investigations in synoptic and dynamic meteorology and physical meteorology, the observational program (surface, upper air, radiation, ozone, atmospheric electricity, radio meteorology, composition of air, precipitation, noctilucent clouds, etc.), the networks for synoptic and other purposes, gaps in network and action to be taken. *Subject Headings:* **1. International Geophysical Year program 2. International Geophysical Year network.**—*M.R.*

8.4–35 551.501.9:550.3:061.3(439.1)

Béll, Béla, **Magyarország részvétele a Nemzetközi Geofizikai Év meteorológiai munkájában.** [Participation of Hungary in the meteorological program of the International Geophysical Year.] *Időjárás,* Budapest, 60(2):97–103, March–April **1956.** 2 figs., 5 refs. Russian and English summaries p. 97. **DLC**—The meteorological program of IGY is described in detail. In Hungary 24 stations will participate with synoptic observation (20 stations), pilot balloon measurement (10), radiosonde measurement (2), radioactivity measurement (1), actinometer (2), actinograph (20), sunshine duration measurement (19) and ionospheric

sounding (1 station). *Subject Headings:* **1. International Geophysical Year program 2. Hungarian participation in IGY.**—*G.T.*

8.4–36 551.5:061

Collaboration with other international organizations. *World Meteorological Organization, WMO Bulletin*, 5(1):23–27, Jan. **1956.** photo. **DWB**—The part played by the WMO or its official representatives in a number of U. N. conferences such as the ECAFE (U. N. Economic Commission for Asia and the Far East), conference in Bangkok on Sept. 12–26, 1955, where hydrological terminology for international use (1200 terms) was examined, deficiencies in hydrologic data discussed, etc.; and ECLA (U.N. Economic Commission for Latin America) where heating degree day statistics for South America were required; FAO (Caracas, Oct. 4–15, 1955) where Forest Meteorology and Research was discussed; IFAP (International Federation of Agricultural Producers) meeting at Rome, Sept. 9–17, 1955; ITU (CCIT), where symbols in synoptic messages were discussed; UNESCO; WFUNA, etc. *Subject Headings:* **1. International organization collaboration 2. Hydrology terminology.**—*M.R.*

8.4–37 551.5:061.3

World Meteorological Organization, **Basic documents (excluding the Technical Regulations).** 2d ed. 1956. Its *WMO [Publication]*, No. 15. BD. 1, **1956.** 143 p. diagr. (fold.). **DWB**—This revised document contains: 1) the convention of the WMO and list of states signatory on or for 120 days after Oct. 11, 1947, the states represented at the IMO conference at Washington on Sept. 22, 1947, and territories having meteorological services but dependent on other IMO states; 2) the Revised General Regulations of the WMO as adopted at the Second Congress of WMO on May 12, 1956. These cover membership, officers, voting, languages, Congress, Executive Committee, Regional Associations, technical commissions, the Secretariat and the functions and terms of reference of each of the above. 3) The legal basis for operation in Switzerland. *Subject Headings:* **1. WMO. Convention 2. WMO. General Regulations.**—*M.R.*

8.4–38 551.5:061.3

Status of membership of the World Meteorological Organization. *World Meteorological Organization, WMO Bulletin*, 4(2):82–83, April **1955.** tables. **DWB**—Two tables showing (1) the 62 States and (2) the 25 Territories or Groups of Territories which were members of WMO as of April 1, 1955 are presented. A 3rd table shows the areas and territories which are not members of the organization, but to which the convention has been applied by various States by virtue of their membership in the WMO. Four notifications concerning: 1) the declaration of the Western German Government that the WMO convention is applicable to the Land Berlin 2) the withdrawal of Indo-China, 3) the application for membership of Laos, South Korea and Cambodia, and 4) the confirmation of the member status of Austria and Viet-Nam are included. *Subject Headings:* **1. WMO membership list 2. World Meteorological Organization.**—*A.M.P.*

8.4–39 551.5:061.3(058)

World Meteorological Organization. **Annual Report, 1955.** Its *WMO Publication*, No. 52, TP. 20, pub. **1956.** 130 p. **DWB**—The complete report on every aspect of WMO activity in 1955, including technical work at the Secretariat, Technical Assistance, UN relations and projects, specialized agency activities (ICAO, FAO, UNESCO, WHO, ITU, ICSU, IUGG, etc.), report on Executive Committee meetings, Technical Commission meetings and numerous external and internal projects, reports, regional activities, activities of the Secretariat, publications, library, budget and finance, staff, quarters, contributions, members and direction of services. *Subject Headings:* **1. WMO annual reports 2. Meteorological service directors.**—*M.R.*

8.4–40 551.5:061.3(06)

World Meteorological Organization. Executive Committee. **Abridged report with resolutions, 7th Session, Geneva, May 13–17, 1955.** *World Meteorological Organization, WMO*, No. 46, RC. 8, **1955.** 61 p. **DWB**—A list of the 15 members of the Executive Com-

mittee and their advisers, and of the 13 members of the secretariat, agenda, a summary of the work (program for 1956; definition of gust, and of visibility; humid tropics research, climatic atlases, technical regulations, IGY, International Meteorological tables, WMO bibliography, finances, publications). Resolutions on most of the above items; an annex on World Climatic Atlas; budget for 1956–9, a list of 57 documents presented, and of scores of resolutions adopted at the various Executive Committee sessions since the first session of the Executive Committee are presented. *Subject Headings:* **1. WMO Executive Committee reports.**—*M.R.*

CONFERENCES

See: **Earth satellite symposium** (Franklin Inst.), 8.4–3; **Turbulent diffusion symposia** (U. S. Dugway Proving Ground), 8.4–4; **Future of arid lands** (White), 8.4–5; **Satellite uses** (Van Allen), 8.4–6; **Southport Conference** (Powell), 8.4–157; **Symposium on Condensation Nuclei** (Mason), 8.4–260; **German Quaternary Union meeting** (Büdel), 8.4–294. **Ice Age investigation** (Büdel), 8.4–294.

SERVICES AND INSTITUTIONS

See: **Antarctic climatology, met.** (Wexler), 8.4–32; **IGY, Hungarian participation** (Béll), 8.4–35; **WMO membership status** (WMO Bulletin), 8.4–38; **Hamburg Agromet. office report** (Franken), 8.4–71; **Giessen Agromet. office report** (Kreutz), 8.4–73; **Trier Agromet. office report** (Lehmann), 8.4–74; **Selivanovo Hydromet. Station and Lenino-Dachnoe Agro-met. Station** (Ponomarev, Chirkov), 8.4–75; **Basic weather services** (Archibald), 8.4–91; **Weather service, Canada** (McLeod), 8.4–127; **Weather service, Canada** (McTaggart-Cowan), 8.4–128; **Bioclimatic Inst., Freiburg** (Lossnitzer), 8.4–309.

8.4–41 551.5:061.3

Canada and the WMO. *Weatherwise*, Boston, 9(2):53, April **1956. DWB**—Canada has been active in international meteorology since the 1870's when exchanges of reports with the U.S.A. were begun. In 1882 Director C. Carpmael sent a report on the Canadian Weather Service to the Copenhagen meeting of IMO. In 1896, Sir Frederick Stupart was sent as a delegate to the Paris IMO meeting. Technical Commissions of IMO and WMO met in Toronto in 1947 and 1953. Middleton and Patterson were presidents of CIMO from 1945–1953. Andrew Thomson, present controller, is a member of the Executive Committee of WMO and President of Regional Association IV (North and Central America). *Subject Headings:* **1. Canadian WMO activities 2. International meteorological relations.**—*M.R.*

8.4–42 551.5:061.1(09)(71)

Short history of the meteorological service of Canada. *Weatherwise*, Boston, 9(2):40–41, 63, April **1956.** photo. **DWB**—Public weather service began in Canada as a cooperative U. S.-Canadian effort in 1873 with regard to storm warnings on the Great Lakes. First weather records were made at Toronto in 1839 and the record has been continuous since. A magnetic-meteorological observatory was established at the University of Toronto in 1840 by the Royal Society. Actually the Canadian Meteorological Society began in 1871, and development was rapid from 1872–1880. Stations spread to the Pacific with the railroad in 1885 and in 1898 a forecast office was opened at Victoria, B. C. The first aerological station (kite) began in 1910 near Toronto; and a grain-weather service at Winnipeg in 1918. Recently the service expanded to 1900 employees, at 1500 stations, 50 forecast offices, $10 million budget. *Subject Headings:* **1. Canadian Meteorological Service history 2. History of meteorological services.**—*M.R.*

8.4–43 551.5:550.3:061(673)

Portugal, José Blanc de, **Assistencia meteorológica e geofísica as actividades económicas de Angola.** [Meteorological and geophysical aids to economic activities of Angola.] Luanda, Angola, Servico Meteorológico, **1955.** 41 p. table. **DWB**—A full description of the development and activities of the Meteorological Service of Angola, especially since 1950, and the value of the services rendered to the economy of the country (with a number of examples of

specific services), the staff, number of observatories and stations (130 in 1949, 264 in 1955), plans for future development and a list of publications of the service. There were 14 synoptic stations, 8 pilot balloons, 3 radiosonde and 1 rawinsonde station in Angola in 1955. *Subject Headings:* **1. Meteorological services 2. Angola.**—*M.R.*

8.4–44 910.1:061.2

A centre for geographical research. *Nature*, London, 178(4525):109-110, July 21, **1956.** 2 refs. **DWB**—Account of the Royal Geographical Society's encouragement of and facilities for research, research publications and promotion of field work. An "Institute of Geographical Work" is proposed, affiliated to the University of London. *Subject Headings:* **1. Geographical research 2. Royal Geographical Society.**—*C.E.P.B.*

8.4–45 551.5:061.1(09)(54)

Roy, S. C., **Growth of Meteorological Service in India with the development of communication facilities during the last hundred years.** *Indian Journal of Meteorology and Geophysics*, 5(2):83–94, April **1954.** 2 figs. **DWB, DLC**—The author discusses the early history of the establishment of a Meteorological Department in India in 1895, the relationship between postal and telegraph communications and the development of synoptic meteorology in India, the use of radio by the Meteorological Service and the introduction of teletype during the war and its use in the post-war period. Two maps showing the present set-up of the meteorological communication system in India are included. *Subject Headings:* **1. History of meteorological services 2. Synoptic meteorology 3. Communication networks 4. Indian meteorological service.**—*I.L.D.*

EDUCATION, HISTORY AND BIOGRAPHY

BIOGRAPHY

See also: R. Lessing, 8.4–155.

8.4–46 551.5:92

Hawke, E. L., **Sydney Eric Ashmore, B.Sc., A.Inst.P., F.R.Met.S. 1 September 1909–14 October 1956. [Obituary].** *Weather*, 11(12):389, Dec. **1956. DWB**—A teacher at Grove Park School, Wrexham, Wales, since Jan. 1937, he introduced meteorology into the Physics course and started a meteorological station. Later he set up a mountain station at Bwlchgwyn, 1267 ft. Wrote many articles. *Subject Headings:* **1. Obituaries 2. Ashmore, S. E.**—*C.E.P.B.*

8.4–47 551.5:92

Belinskiĭ, V. A., **Semidesiatiletie Mikhaila Sergeevicha Averkieva.** [Seventieth birthday of Mikhail Sergeevich Averkiev.] *Meteorologiia i Gidrologiia*, Moscow, No. 3:61–62, May/June **1955.** photo. **DWB**—A sketch of the scientific contributions and activities of M. S. Averkiev, (b. 1885). His earlier publications dealt with the climatology of the Gorki Oblast; later he studied various aspects of radiation balance and illumination of differently oriented surfaces. Very important is his role as teacher and writer of textbooks on meteorology. *Subject Headings:* **1. Biography 2. Averkiev, Mikhail S.**—*I.L.D.*

8.4–48 52:92

Kozieł, Karol, **Professor Dr. Tadeusz Banachiewicz. [Obituary.]** *Przegląd Meteorologiczny i Hydrologiczny*, Warsaw, 8(2):170, **1955. DWB, DLC**—Obituary of the late professor of Astronomy and Director of the Astronomical Observatory of the University of Cracow, member of the Polish Academy of Sciences (Feb. 13, 1882–Nov. 17, 1954). His greatest scientific contributions were made in the field of theoretical and observational astronomy and applied mathematics where he developed the concept and the Cracow school of algebra used not only by astronomers and geodesists, but also by construction engineers. His greatest merit in the field of meteorology was his endeavor to support the continuance of uninterrupted series of observations and records, even during the last war, at the Krakow meteorological

station which is a branch of the Astronomical Observatory. *Subject Headings:* **1. Obituaries 2. Banachiewicz, Tadeusz.**—*A.M.P.*

8.4–49 551.5:92

Weickmann, L., **Zum 150. Geburtstage von Heinrich Wilhelm Dove.** [The 150th anniversary of the birth of Heinrich Wilhelm Dove.] *Berlin, Freie Universität, Institut für Meteorologie und Geophysik, Meteorologische Abhandlungen*, 2(3):9–19, **1954. DWB**—A brief description of the general intellectual, scientific climate and of the status of scientific meteorology during the first third of the nineteenth century is presented. DOVE's position in the development of scientific meteorology is evaluated critically in the light of his environment and from the point of view of the present. *Subject Headings:* **1. General meteorology 2. Biography 3. Dove, Heinrich Wilhelm.**—*I.L.D.*

8.4–50 551.5:92

Keränen, J., **Gustaf Eyvind Sucksdorff, 1899–1955 [Obituary].** *Geophysica*, Helsinki, 5(2):58–62, **1956.** photo. **DLC**—Geophysicist at Central Meteorological Office and lecturer in geophysics at the Univ. of Helsinki, born April 7, 1899, died Oct. 19, 1955. In charge of Magnetic Observatory at Sodankylä in 1927, collaborator in auroral photography with CARL STÖRMER, directed Polar Year Program in geomagnetism, earth currents, atmospheric electricity, solar radiation, illumination, cooling power, auroral and meteorological observation. Remained in charge during war (1939–44). Observatory and his home and property were destroyed by Germans at end of war. Helped design and rebuild new observatory after war. Secretary of Finnish National Committee for International Geophysical Year 1957/58. *Subject Headings:* **1. Biography 2. Obituaries 3. Sucksdorff, G. E.**—*M.R.*

HISTORY

See: **Canada and WMO,** 8.4–41; **Canadian met. service history,** (8.4–42); India, growth of met. service (Roy), 8.4–45; **Heinrich Wilhelm Dove, 150th anniversary** (Weickmann), 8.4–49.

BIBLIOGRAPHY

See also: **Bibliog. on evapotranspiration** (Thornthwaite, Mather), 8.4–27.

8.4–51 551.5:016 551.58:016

†Canada. Dept. of Mines and Technical Surveys. Geographical Branch, **Selected bibliography of Canadian geography with imprint 1954.** Its *Bibliographical Series*, No. 15, **1955.** 56 p. arranged geographically with subject subdivisions. Price: 50c. **DWB**—Papers of meteorological and climatological interest are listed under the subdivision "physical geography" for Canada as a whole, for eastern Canada and for each of the political subdivisions. An appendix contains a list of graduate dissertations and theses on Canadian geography arranged geographically. *Subject Headings:* **1. Bibliography of Canadian meteorological literature 2. Physical geography.**—*I.L.D.*

8.4–52 551.5:550.3:016(673)

†Ferreira, H. Amorim, **Bibliografia meteorológica e geofísica de Angola.** [Meteorological and geophysical bibliography of Angola.] Luanda, Angola, Serviço Meteorológico, **1955.** 9 p. **DWB**—Over 100 references to literature on Angola or on Africa which apply to Angola, are listed without annotation in 4 classes: 1) general works (34 refs.); 2) Angola (66 refs.), 3) geomagnetism (7 refs.), and 4) seismology (1 ref.). Items are arranged alphabetically by author in each section, coverage is to 1955. Material was selected from **Bibliografia Meteorológica de Portugal** and **Bibliog. Geofísica de Portugal.** *Subject Headings:* **1. Meteorological bibliographies 2. Bibliography of Angola 3. Angola.**—*M.R.*

8.4–53 550.342:532.593:016

†Gutenberg, Beno and Andrews, F. (*eds.*), **Bibliography on microseisms, Pt. 2 [continuing] 2d ed. rev. and enl.** California Institute of Technology, Contract AF 19(122)-436, Scientific

Report, No. 2, Jan. **1956.** Refs. No. 469–600, with paging 95–134, in continuation of the 2d rev. and enlarged edition of Sept. 1952. **DWB**—Author arrangement. Abstracts are of varying length and are made by GUTENBERG, or taken from author's abstracts or **Geophysical Abstracts.** Many are concerned with relation of microseisms to ocean swell storms or forecasting. Include papers published through 1954 and some for 1955. (For abstract of 2nd ed., *see* 5K–133, Nov. 1954, *MAB.*) *Subject Headings:* **1. Microseism bibliography 2. Storm microseisms.**—*M.R.*

8.4–54 551.5:779

U. S. Air Force, **Air Force film directory.** Its *AF Manual* 95-2, Sept. 15, **1955.** 300 p. **DWB**—On p. 288–89 of this catalog and index of Air Force films (which are not restricted for military reasons) there is a list of 31 films classified under the heading **Meteorology.** Each respective film is described in some detail, including running time, in the body of the directory (p. 1–228). An alphabetical index is found on p. 229–255, and subject index on p. 257–294. The films were prepared during 1941–1955, and cover subjects such as hurricane hunters, thunderstorm theory, solar and terrestrial radiation, diffusion of smoke and gas clouds, aerology, icing, fog, turbulence, convection, and military climatology. *Subject Headings:* **1. Meteorological films 2. Catalogs of moving picture films.**—*M.R.*

8.4–55 91:016

†Vsesoiuznoe Geograficheskoe Obshchestvo, Leningrad, **Spisok geograficheskoĭ literatury, vyshedsheĭ v SSSR i postupivsheĭ v bibliotaku Geograficheskogo Obshchestva Soiuza SSR za vremia iiul'-dekabr' 1953 g.** [Bibliography of geographical literature published in U.S.S.R. and received at the library July–Dec. 1953.] Its *Izvestiia*, 86(5):485–498, Sept./Oct. **1954.** entirely refs. **DLC**—The number of Russian accessions amounted to approximately 700 titles, excluding periodical reprints, monographs, etc. dealing with physical, economic and political geography, economics, agriculture, etc. Foreign accessions amounted to about 200 titles. The bibliography evidently included all items coming from the U.S.S.R. proper. The foreign literature covers the same fields as the Russian literature. *Subject Heading:* **1. Bibliography of geography.**—*I.L.D.*

PRACTICAL AND APPLIED METEOROLOGY

ASTRONAUTICS—SATELLITE OBSERVATORIES

8.4–56 551.507.36

Montefinale, G., **Sul satellite artificiale per ricerche geofisiche ed astrofisiche.** [Artificial satellite for geophysical and astrophysical research.] *Rivista Marittima*, Rome, 90(7):43–60, July **1956.** 5 figs., refs. **DLC**—In this comprehensive report on the MOUSE project planned by the U.S.A. for the International Geophysical Year, problems connected with the orbit of the satellite, construction and equipment of the vehicle, the telemetering system and the radiation conditions existing at various altitudes in the earth's atmosphere (diagram) are discussed. *Subject Headings:* **1. Artificial satellites 2. Project "MOUSE" 3. International Geophysical Year, 1957–1958.**—*G.T.*

8.4–57 551.507.36:629.19

Newell, Homer E., Jr., **The satellite project.** *Scientific American*, N. Y., 193(6):29–33, Dec. **1955.** figs. **DWB, DLC**—Difficulties in launching a small artificial satellite, scheduled for IGY, 1957/8, are enumerated and shown clearly in maps and schematic diagrams. It must be at least 200 miles up, perfectly horizontal at time of release, should weigh 20 or 30 lbs and contain some of the most essential instruments and a power supply. Such a small "bird' could measure cosmic rays, geomagnetic field, UV and X-radiation from the sun, electrical currents and charges in the high atmosphere, meteorites and composition, density, etc. of matter in space (just beyond the earth's atmosphere). Specific problems are discussed (cosmic rays, solar radiation and the Chapman-Störmer ring). *Subject Headings:* **1. Satellite program 2. Upper atmosphere physics 3. International Geophysical Year, 1957–1958.**—*M.R.*

8.4–58 551.507.36:551.510.5

Vassy, E., **Les satellites artificiels, leur interêt pour l'étude de l'atmosphere.** [Artificial atellites: their importance in the study of the atmosphere.] *La Météorologie*, Paris, Ser. 4, o. 40:283–290, Oct./Dec. **1955.** 3 figs., eqs. English and Spanish summaries p. 283. **WB** The writer shows that it is necessary for some types of research to have a means of apid high-altitude exploration along a meridian. He reviews solar emission in the ultra-iolet range, X-radiation, charged particles causing northern lights and variations in the earth's agnetic field, in cosmic radiation and their effects on the upper atmosphere. It is demon-rated that it is possible to make artificial satellites. Summary report of the American MOUSE" Project. *Subject Headings:* **1. Artificial satellites 2. Project "MOUSE" 3. Upper tmosphere research.**—*Author's abstract.*

8.4–59 551.507.362

Singer, S. F. (*Univ. of Maryland*), **Satellites for physicists.** *Physics Today*, 9(4):21–23, pril **1956.** 5 figs. **DWB, DGL**—Problems involved in launching and in instrumentation of atellites and advantages for geophysical and astrophysical research are reviewed. Orbital, agnetic, cosmic ray and gravity observations are stressed. *Subject Heading:* **1. Satellite bservatory problems.**—*M.R.*

AERONAUTICAL METEOROLOGY

See also: **Air navigation** (Weems), 8.4–10; **Aircraft damage from thunderstorms** (Frank), 8.4–202; **High-level icing** (Painting), 8.4–264; **Hail damage to aircraft** (Harrower, Evans), 8.4–276.

8.4–60 551.591.3:656.71

*Barr, Norman Lee; Hussman, T. A., Jr. and Parker, J. F., Jr., **Visibility of airport run-ays.** *U. S. Naval Medical Research Institute, Bethesda, Research Report*, 12:435–480, Nov. 5, **1954.** 4 figs., 4 plates, 30 tables, 8 refs. **DWB**—Brightness contrast between airport unways and surrounding country was measured from an airplane on the runway and the orresponding data (both as to runway surface, length, orientation and location; and the ackground and contrast) tabulated for 30 airports in the East Coast states of the U. S. nstruments used were an electronic photometer mounted on a Navy R4D airplane, along ith an amplifier and meter. The tables allow comparison between runways at a given rport, or between airports or types of surfaces. Best contrast is between a concrete runway nd an earth background (−1,175), and grass against asphalt the poorest (0.045), seriously educing visibility. Brightness contrast is more important at a distance than color contrast, ut color and texture become important at close range. *Subject Headings:* **1. Brightness ontrast 2. Runway visibility 3. Runway contrast 4. Albedo of runways.**—*M.R.*

8.4–61 551.557.36551.553.6

*Japan. Hydrographic Dept., **Kaigun Koku Kichi Shiryo.** [Navy base planning data, o. 2, Sakhalin and Kurile Islands], [ca. **1939.**] (10 p.) 5 charts (4 fold.). In Japanese. **LC** –Along with large folded sheets consisting of photos and charts showing topography nd layout of runways, facilities, etc. on bases in Sakhalin and Kuriles, is a series of monthly ind roses for the surface and for 1 and 3 km above sea level and the number of observations n which they are based. *Subject Headings:* **1. Upper air wind roses 2. Surface wind roses Sakhalin 4. Kurile Islands.**—*M.R.*

8.4–62 551.5:629.13(98)

Pedersen, Einar Sverre (*Scandinavian Airlines System, Stockholm*), **Polar airline naviga-on.** *Navigation*, Los Angeles, 4(7):270–274, Sept. **1955. DLC, DWB**—Exploratory, charter nd regular commercial flights performed by S.A.S. (Scandinavian Airlines System) over the rctic (shortest routes from Europe to the West Coast of America and the Far East) have roved these flights can be made safely provided flight planning and flight navigation are per-rmed carefully. But commercial navigation technique has to be different from the methods navigation developed by USAF, RAF and RCAF fliers because commercial airplanes are

not yet equipped with airborne radar. Lack of space on a modern airliner restricts the use of 2 navigators. Extensive utilization of the single grid heading method makes the navigator's work easier. The introduction of latitude integration in the Polarpath system relieves the navigator from worrying about gyro drifts and the Kollsman's sky-compass makes twilight flying safer. But a dependable navigational aid independent of sky conditions and ionospheric conditions, is still missing. The radio sextant will probably be the answer to the shortcomings of trans-Arctic aviation. *Subject Headings:* **1. Aeronautical meteorology 2. Arctic aviation.**—*A.M.P.*

8.4–63 551.506:656.71

Škoda, Karel, **Stanovení využitelnosti letišť na základe meteorologických pozorování.** [Determination of airport usability on the basis of meteorological observations.] *Meteorologické Zprávy*, Prague, 8(6):160 164, **1955.** 5 figs., 3 tables. Russian and English summaries p. 160. **DWB**—A method is proposed for calculating the usability of runways with regard to the surface wind speed and direction. This method is compared with methods used by certain ICAO member states. The new method is also extended to visibility, height of ceiling, amount of clouds and sliding conditions of the runway surface. By analyzing these elements a statistical basis is obtained for determining the usability of any runway equipped with suitable navigational aids, regardless of its orientation. *Subject Headings:* **1. Airport usability 2. Wind velocities.**—*From author's abstract.*

8.4–64 551.558.21:797.55

U. S. Weather Bureau, **The mountain wave: what it means to the pilot.** Its *Aviation Series*, No. 5, **1955.** 8 p. photos. Price: $.05. Originally issued as a Map-back article from its *Daily Weather Map*, March 2, **1955. DWB**—A review, in nontechnical language, of practical results of research work carried out in recent years, directed towards gaining a better understanding of air flow over mountain barriers. The author explains and discusses several conditions and cloud forms to be looked for by pilots, as indications of, whether or not, waves may develop and, roughly, their intensity. Further, some safeguards and advice is suggested to pilots for flying into an area of suspected wave conditions. *Subject Headings:* **1. Mountain wave flying 2. Airflow over mountains.**—*A.M.P.*

GLACIOLOGY

See: **Ice Age investigation** (Büdel), 8.4–294; **Ice Age, Black Forest** (Heybrock), 8.4–296; **Quaternary land ice, Siberia** (Mölder), 8.4–297; **Glaciation, NE Scotland** (Synge), 8.4–300.

MARINE METEOROLOGY AND OCEANOGRAPHY

See also: **Sea and its rivers** (Malkus), 8.4–18; **New Arctic discoveries** (Czeppe), 8.4–29; **Ships' weather messages** (Rodewald), 8.4–129; **Temp. over southern oceans** (van Loon), 8.4–210; **Mechanism of wind waves** (Nikiforov), 8.4–236; **Spectrum of swells** (Walden), 8.4–239.

8.4–65 551.509.34(26)

Great Britain. Naval Weather Service, **Single observer forecasting at sea in middle and high latitudes.** Its *Memo* No. 156/55, Oct. **1955.** 46 p. 8 figs., 4 tables, 15 refs. Mimeo. **DWB**—Single observer forecasting depends mainly on estimates of positions of fronts and pressure systems, sometimes with the aid of radar, upper wind or airplane observations. The first section deals with the characteristics of air masses at sea and associated weather, estimation of vertical temperature and humidity distribution, and mechanism of cloud formation. The structure, recognition and weather changes of fronts are next dealt with. Other sections refer to diurnal effects and pressure systems. Methods of forecasting are taken up, including prognostics of winds, cloud, visibility, precipitation, turbulence, freezing level, etc. An appendix describes uses of upper winds in single observer forecasting. *Subject Headings:* **1. Single observer forecasting 2. Marine forecasting.**—*C.E.P.B.*

8.4–66 551.501:551.55:551.465

Johnson, Peter W., **The ratio of the sea-surface wind to the gradient wind.** [Ch. 9 of unidentified source, pub. 1954?] p. 104–110. fig., 3 tables, 5 refs. **DWB**—Instead of using tables of correction factors for geostrophic winds, taking stability of air mass into account, tables are presented to apply a sea-air temperature difference to the gradient wind in order to obtain the sea surface wind, at low speeds (<15 kn) the sea-air temperature difference is the main influence on the ratio Vs/Vg (sea/gradient wind speed). Above 15 kn the frictional effects become greater as the wind speed increases. A nomogram allows the ratios to be obtained readily for any wind speed up to 50 kn, and temperature difference −10° to +26°C. In actual use, a root mean square deviation of ±3.32 kn was obtained compared with ±4.2 kn for the older method. It was found that there was a bias towards high values of +3.0 kn in estimating surface wind from plotted Beaufort winds. *Subject Headings:* **1. Sea surface wind computation 2. Air-sea temperature difference. I. Contract Nonr-285(03) II. N. Y. Univ. College of Engineering. Research Div.**—*M.R.*

8.4–67 551.501:551.55(26)

Seilkopf, H., **Eine "Nullmethode" zur Messung der Windgeschwindigkeit auf See.** [A "null" method for measuring wind velocity at sea.] *Wetterlotse*, No. 108:227–231, Nov. 1956. table. **DLC**—The Beaufort scale was designed for sailing ships. P. PETERSEN devised Beaufort equivalents for sea disturbance, which are given in full, but further comparison is needed. When a ship has a following wind, this can be done by adjusting the speed of the ship to equal the speed of the wind. *Subject Heading:* **1. Wind measurement at sea.**—*C.E.P.B.*

8.4–68 656.61:551.5

von Zatorski, Walther and Rodewald, M., **Zur Routenwahl bei Ballastreisen nach Nordamerika.** [Choice of route for voyages in ballast to North America.] *Wetterlotse*, No. 109/10: 261–266, Dec. 1956. 2 figs. **DLC**—VON ZATORSKI states that the German coal fleet often has to go out in ballast and would be helped by radio weather charts and analyses from Washington to avoid ice and fog. RODEWALD gives mean pressure charts for May and June 1956 to illustrate the southern route for low-powered steamers. *Subject Heading:* **1. Weather planning of sailing routes.**—*C.E.P.B.*

AGRICULTURAL METEOROLOGY

See also: **Agromet.** (Vitkevich), 8.4–9; **Practical agromet.** (Gol'tsov), 8.4–12; **Vineyard phenology** (Garnier), 8.4–104.

8.4–69 551.524.37:632.111.3

Aoki, Kiyoshi, **Freezing curve of the twig of mulberry tree (Analysis of the freezing process of living organisms, Pt. 12).** *Low Temperature Science, Ser. B., Biological Sciences*, Sapporo, Japan, 13:1–12, 1955. figs., 6 refs. In Japanese; English summary p. 12. Also his: **On the artificial hardening of the twig of mulberry tree.** *Ibid.*, p. 13–20. 4 figs., 4 refs. In Japanese: English summary p. 20. Also Sakai, Akira: **Relationship between the process of development and the frost hardiness of the mulberry tree.** *Ibid.*, p. 21–31. 3 figs., 6 tables, 8 refs. In Japanese; English summary p. 31. Also his: **Seasonal changes of the hardiness of the physiological state of the vortical parenchyma cells of mulberry tree.** *Ibid.*, p. 33–41. In Japanese; English summary p. 41. Also his: **Method of testing the survival of the twig.** *Ibid.*, p. 43–50. fig., 10 photos, 3 tables, 5 refs. In Japanese; English summary p. 50. **DWB, DLC**—Numerous tests were made to determine the mechanics of the freezing of mulberry twigs, the degree of frost resistance and whether resistance could be increased by subjecting the twigs to 0°C for 10 days. The refreezing curve is different for twigs damaged by frost than for undamaged twigs. Seasonal changes were studied and it was found that frost resistance increases from Sept. to a maximum in Dec., maintains a level until end of Feb. and decreases from March on. Cortical parenchyma cells are hardiest of tissue cells and can stand freezing at −40°C for 24 hrs in winter. Water permeability increases in winter. Survival

can be tested by measuring electrical resistance of previously frozen twig sap. *Subject Headings:* **1. Freezing of twigs 2. Frost resistance of plants.**—*M.R.*

8.4–70 551.5:63:061

Bobrov, V. Ia. and Soloshenko, V. A., **Meteorologicheskoe obsluzhivanie sel'skogo khoziaïstva Stavropol'skogo kraia.** [Meteorological service to agriculture in the Stavropol' region.] *Meteorologiia i Gidrologiia*, Leningrad, No. 6:49–50, Nov./Dec. **1955.** **DWB, DLC**—In view of the diversity of the climate of the Stavropol region, specialized meteorological and agrometeorological services have to be provided. These include special forecasts for the growing and harvesting season, warning service against frosts and drought and advice to prevent damage to crops from such impending catastrophes, participation in agricultural conferences dealing with introduction of new crops, increasing harvesting yields, expansion of phenological network, etc. Specific examples of the service given by the hydrometeorological service during recent years are given. *Subject Headings:* **1. Agricultural meteorology 2. Agrometeorological services 3. Frost warning services 4. Stavropol Region, U.S.S.R.**—*I.L.D.*

8.4–71 551.5:63:061.1(435.1, 434.7)

Franken, E., **Tätigkeitsberichte der Agrarmeteorologischen Dienststellen, Hamburg.** [Activity report of the Agrometeorological Office at Hamburg.] *Germany. Deutscher Wetterdienst, Mitteilungen*, 2(14):66–71, **1955.** 4 figs., 5 refs. Also: Aichele, H., **Tätigkeitsberichte der Agrarmeteorologischen Dienstellen, Stuttgart-Hohenheim.** [Activity report of the Agrometeorological Office at Stuttgart-Hohenheim.] *Ibid.*, 2(14):86–99, **1955.** 10 figs., 2 tables. **DWB**—1) The development of the Agricultural Meteorological Experimental and Consultation Service of Hamburg and the scope of its activities are described. In 1954 studies were carried out on frost prevention by means of fans, the determination and mapping of localities in the fruit growing regions near the North Sea (Melendorf-Wulfsdorf-Volksdorf), and on wind protection. The various studies published are listed. Also precipitation studies were made for assessing agricultural land. 2) The various projects carried out by the Stuttgart-Hohenheim included mapping of frost-threatened vineyards, an investigation of soil moisture balance of the clay soils of the Filder Valley, and studies of evaporation during different weather situations. A new soil moisture measuring device consisting of a pressurized flask in which is placed the substance, the moisture of which is to be determined with an exactly measured amount of melted calcium carbide; from this interaction acetylene gas develops. Frost protection devices are listed. Other activities in which the agrometeorological service engaged are described. The article contains graphs and tables showing the relationships between precipitation, evaporation, soil moisture and percolation at Hohenheim during 1952, soil moisture balance during 1952 and 1953, mean daily values of water loss of different evaporimeters, etc. *Subject Headings:* **1. Agrometeorological services 2. Hamburg Agrometeorological Office 3. Stuttgart-Hohenheim Agrometeorological Office 4. Hamburg, Germany 5. Stuttgart, Germany.**—*I.L.D.*

8.4–72 551.5:595.7

†Johnson, C. G., **Ecological aspects of aphid flight and dispersal.** *Rothamsted, England. Experimental Station, Report* 1955:191–201, **1956.** 31 refs. **DA**—Recent work is described. The life history of aphids is set out. Maturation and take off depend on temperature; the causes of aerial density change from hour to hour, and the density curve can be reconstructed theoretically. Dispersal through the atmosphere (mostly 100–>1000 ft) is mainly due to vertical currents, partly to upward flight, and in stable air and at night the air clears quickly. Control methods are discussed. *Subject Headings:* **1. Vertical current effects 2. Insect migrations 3. Aphids.**—*C.E.P.B.*

8.4–73 551.5:63:06(43)

Kreutz, W., **Tätigkeitsberichte der Agrarmeteorologischen Dienststellen, Giessen.** [Activity report of the Agro-Meteorological Office at Giessen.] *Germany. Deutscher Wetterdienst, Mitteilungen*, 2(14):40–65, **1955.** 26 figs., tables. **DWB**—During 1954, the agrometeorological station carried out studies on soil climate in particular, the water balance of the soil by measuring evaporation of soil moisture of various types of soil, development of im-

provements of the Popov evaporimeter, on comparative evaporation measurement with the Piché evaporimeter and the Wild balance, on the influence of different types of wind protection of plantings upon local climate, phenological and growth characteristics of wind protected plantings and it maintained current observations on soil temperature and soil moisture and on barn and greenhouse climates. In addition, numerous rural climatic studies were carried out for the purpose of estimating the value of farming land; examples of these studies are described. The work plan for 1955 is outlined. *Subject Headings:* **1. Agrometeorological services 2. Hydrologic cycle 3. Evaporimeters 4. Soil moisture 5. Giessen, Germany.**—*I.L.D.*

8.4–74 551.5:63:061.1(434.25)

Lehmann, P., **Tätigkeitsberichte der Agrarmeteorologischen Dienststellen, Trier.** [Activity report of the Agrometeorological Office at Trier.] *Germany. Deutscher Wetterdienst, Mitteilungen*, 2(14):99–104, **1955.** 4 figs., 2 tables. **DWB**—In 1954 the agrometeorological station was combined with the Trier weather station. The activities during this year included forecast of wine quality for 1954, studies on the correlation between wine quality, temperature, radiation, etc., studies on protection of strawberries against cold, climatic mapping, etc. *Subject Headings:* **1. Agrometeorological services 2. German Meteorological Service 3. Trier, Germany.**—*I.L.D.*

8.4–75 551.5:63(064)

Ponomarev, P. D. and Chirkov, Iu. I., **Gidrometsluzhba na raĭonnykh sel'skokhoziaĭstvennykh vystavkakh: Gidrometeostantsiia Selivanovo** [i] **Agrometeostantsiia Lenino-Dachnoe.** [Hydrometeorological Service in regional agricultural exhibitions: Selivanovo Hydrometeorological Station and Lenino-Dachnoe Agro-meteorological Station.] *Meteorologiia i Gidrologiia*, Leningrad, No. 6:51–52, Nov./Dec. **1955.** photo. **DWB, DLC**—At the annual agricultural expedition following the harvest season, the hydrometeorological service presented an educational exhibit of its service to agriculture. The exhibits included diagrams of mean temperatures and precipitation for various years and normals of these values, the snow cover, minimum soil temperatues, and other meteorological factors influencing the winter crops and the conditions influencing the growth and development of potatoes during the past year, etc. *Subject Headings:* **1. Agrometeorological exhibitions 2. Agricultural exhibitions 3. Potatoes.**—*I.L.D.*

INDUSTRIAL METEOROLOGY AND HYDROLOGY

See also: **Radiation in architecture and town planning** (Pleijl), 8.4–24; **Television weather programs** (Jehn), 8.4–126.

8.4–76 551.5:368.23

Höller, E., **Schädensfälle am Ladungsgut und ihre meteorologische Deutung.** [Cases of damage to cargoes and their meteorological significance.] *Wetterlotse*, No. 108:222–226, Nov. **1956.** Also his article of similar title, *Ibid.*, No. 109/110:250–261, Dec. **1956. DLC**—1) Examples of damage to cargo and their causes are discussed. An explosion of chemicals in the Red Sea was due to overheating in an unventilated hold. Cases of corrosion were due to condensation in the tropics after loading in a cold climate. 2) A ship from E coast of S. America reaching central Europe in winter, and a ship from Gold Coast to Europe passing through cold Cape Verde Current, both carrying cocoa—a moist cargo—suffered great damage to the cargo. This is attributed to condensation on sides and roof of hold dripping on to the cargo. The mistake was loading in damp conditions. Cases of corrosion of cargo unloaded in W. African ports are quoted and diagrams of monthly rainfall and raindays are given to show the dangerous months. Solar radiation is also a danger. Damage can be avoided by suitable packing and other precautions. *Subject Heading:* **1. Cargo damage.**—*C.E.P.B.*

8.4–77 627.8:532.54

Vol'ftsum, I. B., **Raschet ploshchadi secheniia truby, soediniaiushcheĭ verkhniĭ b'ef vodosliva s kolodtsem samopistsa.** [Calculation of the area of the cross section of pipes connecting the upper water of a spillway by means of a self-recorder.] *Meteorologiia i Gidro-*

logiia, Leningrad, No. 1:41–42, Jan./Feb. **1955.** 3 refs., 5 eqs. **DWB**—The equation devel oped by the author for calculating the connection of the pipe is $\omega = \frac{0.45\rho\Omega}{\sqrt{H}}$ where ω = cros section of pipe, ρ = rate of increase of water level in well of self recorder, Ω = area of horizonta cross section of the well of the self-recorder, and g = acceleration of gravity; $\sqrt{H}$ = differenc between level of water of upper water of the spillway and of the well of the self-recorde *Subject Headings:* **1. Hydraulic engineering 2. Flow in pipes.**—*I.L.D.*

MEDICAL METEOROLOGY

See also: **Effects of cold on man** (Edholm), 8.4–311; **Radiational cooling** (Malysheva), 8.4–312.

8.4–78 551.586:616.2

Huber, Tyron E.; Joseph, Sheldon W.; Knoblock, Edward; Redfearn, Paul L. an Karakawa, James A., **New environmental respiratory disease (Yokohama asthma): pre liminary report.** *Archives of Industrial Hygiene and Occupational Medicine*, Chic., 10(5):39 408, Nov. **1954.** 3 figs., 4 refs. **DLC**—The clinical entity known as "Yokohama asthma occurring in Japan during the winter months among U. S. troops is described. A graphic correlation is established between the atmospheric content of ether-soluble aerosols and dus and the occurrence of the respiratory syndrome. *Subject Headings:* **1. Meteorological in fluences on disease 2. "Yokohama asthma."**—*I.L.D.*

8.4–79 551.5:6

Ochkina, E. N., **Effektivnost' dlitel'nogo prebyvaniia na otkrytom vozdukhe deteĭ sanatorno-lesnoĭ shkole.** [Effectiveness of extensive stay in open air for children in co valescent open air schools.] *Gigiena i Sanitariia*, Moscow, No. 10:26–30, Oct. **1955.** fig 3 tables, 6 refs. **DLC**—As a result of a series of experimental studies it was found that nc turnal sleep in open air increases the effectiveness of measures promoting convalescenc nocturnal sleep in the open air is possible in a sleeping bag when the outside air varies betwe 5° and −15°C; a supplementary cover of cotton wadding is necessary when the temperat is −20°C. The physiological effects of open air sleep such as blood picture, depth of sle breathing responses, etc. are discussed. *Subject Headings:* **1. Physiological meteorolo 2. Open air sleeping.**—*I.L.D.*

METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

METHODS OF OBSERVATION

See also: **Radiation in architecture and town planning** (Pleijl), 8.4–24; **IGY, 1957–58, met. programme** (Van Mieghem), 8.4–34; **IGY, Hungarian participation** (Béll), 8.4–35; **India, growth of met. service and communication facilities** (Roy), 8.4–45; **Sea surface wind computation** (Johnson), 8.4–66; **"Null" method for wind measurement at sea** (Seilkopf), 8.4–67; **Meridional cross sections, S. Hemisphere** (van Loon), 8.4–103; **Transosondes** (Anderson, Mastenbrook), 8.4–105; **Virtual temp. formulas** (Désí), 8.4–167; **Energetics of large scale atmos. turbulence** (Saltzman), 8.4–224; **Derivation and synthesis of unit hydrograph** (Eaton), 8.4–284.

8.4–80 551.501:551.52

Wegener, K., **Der historische Fehler der Messungen der Sonnenstrahlung.** [Histor error in the measurement of solar radiation.] *Berlin. Freie Universität. Institut für teorologie und Geophysik, Meteorologische Abhandlungen*, 2(4):141–144, **1955.** ref. **DW** Radiation from the sun has been measured for about 100 years, but it still is not precise enou to suit the author. The chief trouble is that one measures not only the temperature of sun but that of the intervening air column or mass. By using Linke's tables for correctio the Boltzmann radiation, such errors can be nearly eliminated. *Subject Headings:* **1. Sc radiation measurement 2. Radiation errors.**—*M.R.*

8.4–81 551.501.4:551.507.362

Groves, G. V., **Effect of experimental errors on determinations of wind velocity, speed of sound, and atmospheric pressure, in the rocket-grenade experiment.** *Journal of Atmospheric and Terrestrial Physics*, 9(5/6):237–261, Nov. **1956.** 2 figs., 5 tables, 2 refs., 110 eqs. **DWB**—"Expressions are obtained for systematic and random errors in the grenade-experiment determinations of wind velocity, speed of sound, and atmospheric pressure, arising from systematic and random errors in the various quantities measured, viz. the co-ordinates and time of explosion of each grenade and the co-ordinates of each microphone and the times of arrival of the sound waves. The theory is first developed for a general distribution of microphones on the ground and of grenade bursts in the air. The results obtained are applied to the special case of four microphones, comprising a central microphone and three symmetrically placed microphones, with grenades bursting vertically above the central microphone. Under certain simplifying assumptions, expressions are obtained to show how the errors in the final determinations are related to the measurement errors, and also their dependence on the distance apart of the microphones, the spacing between the grenade bursts, and the nature of the atmospheric structure under investigation. Values are calculated for the errors that would arise in wind velocity, speed of sound, and pressure under certain typical conditions." Upper air pressure, vertical and horizontal wind speeds, and temperatures, can be accurately determined (to 1 m/s in wind and 1% pressure) if the microphones are adequately spaced. *Subject Heading:* **1. Rocket grenade experiments.**—*Author's abstract and C.E.P.B.*

8.4–82 551.501.7:551.557.2:551.547

Bundgaard, Robert C., **Computation of streamlines from the pressure field.** *Journal of Meteorology*, 13(6):569–582, Dec. **1956.** 15 figs., 3 tables, 9 refs., 19 eqs. **DWB**—The problem of constructing non-permanent non-horizontal streamlines, involving ageostrophic motion, from the observed or predicted pressure field is discussed analytically and a bicubic solution obtained. This was tested by comparison of computed streamlines with 500 mb contours and observed streamlines (480 cases); in 84% the computed streamlines were as good as or better than the contours. A graphical technique suitable for daily weather mapping is described but a less laborious qualitative routine is advised. A number of examples of jet stream analysis over western Europe are illustrated, showing that in forecasting upper winds systematic ageostrophic departures should be introduced. *Subject Headings:* **1. Streamline construction 2. Upper air wind computation.**—*C.E.P.B.*

8.4–83 551.501.7:551.510:621.396.11

Hooper, A. H., **Abnormal V.H.F. propagation: determination of radio refractive index structures from weather data.** *Wireless World*, London, 62(6):295–298, June **1956.** 3 figs., 3 tables. **DLC**—V.H.F. propagation is related to vertical structure of radio refractive index. A method is given of plotting this variation with height up to 8000 ft from pressure and "refraction temperature" T_r based on observed temperature and humidity. A graph of T_r against air temperature and dew point, and instructions for preparing and using a plotting chart, are given. *Subject Headings:* **1. Ultrashort wave propagation 2. Refractive index of electromagnetic waves 3. Radio transmission ducts.**—*C.E.P.B.*

8.4–84 551.501.81:551.577.1

Battan, Louis J. and Braham, Roscoe R., Jr., **A study of convective precipitation based on cloud and radar observations.** *Journal of Meteorology*, 13(6):587–591, Dec. **1956.** 6 figs., 8 refs. **DWB.** Shorter version in *Weather Radar Conference, Sept. 1955, Proceedings of the 5th Conference*, p. 315–319, pub. **1956.** fig., 3 refs. **DWB**—Cumuli were examined by airborne radar over the Caribbean, central U.S.A. and New Mexico for % with precipitation echo in relation to height of cloud top, cloud diameter, and cloud top temperature. Broader clouds give echoes at lower cloud-top heights than narrower clouds. Geographical differences are discussed. In tropical convective clouds precipitation is initiated by an all-water process, but in central and south-western U.S.A. sublimation coalescence may also occur, becoming increasingly effective when the cloud top extends above −20°C isotherm. *Subject Headings:* **1. Radar precipitation echoes 2. Rain formation 3. Rain from nonfreezing clouds.**—*C.E.P.B.*

8.4–85 551.501.81:551.578.41

Douglas, R. H.; Gunn, K. L. S. and Marshall, J. S., **Pattern in the vertical of snow generation.** McGill Univ. Macdonald Physics Laboratory, Contract AF 19(122)-217, Scientific Report MW-21, July, **1956.** 153 p. 29 figs. (incl. photos), table, 16 refs., eqs. numerous figs. and tables in appendix. **DWB**—The beam of a moderately sensitive 3-cm radar has been kept pointed to the zenith. Height/time records of snow echoes covering seven winter weeks have been correlated with analyses of standard upper-air data. The major part of the record in nearly every storm contains trail patterns, formed as the snow falls from generating cells aloft. The related generating level occurs somewhere between 11,000 and 20,000 ft, between −12C and −34C, more often than not in maritime polar air. The lowest quarter of the air-mass is favored, and in half the cases considered the generating level lies within 2000 ft of the maritime front. In all but two of the cases the snow generation takes place in stable air. Terminal speeds, deduced from the trail patterns, are estimated to range from 1 to 6 ft sec^{-1}. At the leading edge of a storm the radar usually records snow overhead for some time before any snow falls at the radar site. Occasionally the lower edge is patterned by pendulous extensions; these "stalactites" are associated with snow falling into dry air, and are probably the pattern of overturning as air, chilled by evaporation, descends. Toward the end of a storm the records tend to lack pattern, and the height of echo tends to lower. It may be that a different precipitation mechanism is involved; on the other hand it may be that with decreasing intensity of snow the radar is unable to see to the higher levels where pattern exists. Observations of snow cells, together with terminal-speed evidence of aggregation at low temperatures, suggest a turbulent convective mechanism, even though the cells occur in stable air. The role of growing ice crystals, acting as a thermal source, is examined. In moist stable air the latent heat of sublimation released by growing ice crystals may result in significant vertical development, comparable to the observed depth of snow generating cells. Calculated updraft velocities are comparable to the terminal speeds of ice crystals or aggregates. In air containing supercooled water cloud the "sublimational" updraft is much lower than in cloud-free air; thus shear and turbulence could develop across a cloud boundary in the presence of growing ice crystals, and be a significant factor in their aggregation. It is suggested that cloud boundaries, along which aggregation is favored, may serve as the bases for the snow generating cells. *Subject Headings:* **1. Radar echoes from snow 2. Radar analysis of snow 3. Snow crystal formation 4. Snow patterns in the atmosphere.**—*Authors' abstract.*

8.4–86 551.501.81:551.578.7:551.506.7(237.1)

Harrison, Henry T. (*Weather Adviser, United Air Lines, Inc.*), **The display of hail echoes on 5.5-cm. weather mapping radar.** *Aeronautical Engineering Review*, N. Y., 15(5):102–109, May **1956.** 20 figs., 8 refs. **DLC**—During 1953, United Airlines conducted tests by means of C-band radar mounted on a DC-3 plane. In all, 40 flights were made over the east slope of the Rocky Mountains and hail fell on 23 of these flights. A finger or hooked finger echo was observed on the radar scope in 82 pictures out of 84, and scalloped edges in 32 cases. In 42% of the cases the thunderstorm echo was not strong. A number of cases are described in detail and illustrated (both by aerial photos of the hail and the radar scope showing the fingers). Ground tests in 1954 and 1955 (radar mounted in DC-3 on runway) are correlated with a 40-station hail observing network in the Denver area. Eleven of these photos are reproduced and discussed. Fingers, etc. were noted on 97%. *Subject Headings:* **1. Radar echoes from hail 2. C-band weather radar 3. Airplane investigations 4. Denver area.**—*M.R.*

8.4–87 551.501.81:551.578.41:551.551

Hitschfeld, Walter and Dennis, Arnett S., **Measurement and calculation of fluctuations in radar echoes from snow.** McGill Univ. Macdonald Physics Laboratory, Contract AF 19(122)-217, Scientific Report MW-23, July **1956.** 50 p. 13 figs. (incl. photos), 2 tables, 24 refs., numerous eqs. **DWB.** Also their: **Fluctuations in radar echoes from snow.** (Shorter version of preceding article.) *Weather Radar Conference, Sept. 1955, Asbury Park, N. J., Proceedings of the 5th Conference*, p. 249–254, pub. **1956.** 7 figs., 8 refs. **DWB**—Intensities of the snow echoes obtained by a zenith-pointing radar from 180 different contributing regions are compared with suitably chosen thresholds. The probability of the intensities exceeding

such a threshold and the frequency with which two intensities separated in time straddle it, are used to deduce the autocorrelation coefficients of the signals. These coefficients are approximately Gaussian functions of the time, decaying to one-half of their initial values in 1.7 to 12 milliseconds. These times are only a little longer than the few earlier results for cloud, drizzle and rain obtained by BARTNOFF, ATLAS and PAULSEN (1952) and by FLEISHER (1953c), but are short enough to show that the smoothing of radar weather echoes by the averaging of independent data is not a much greater problem for snow than for rain. The autocorrelation coefficient, after correction for receiver noise, is shown to be the product of three partial coefficients due to the differential settling of the particles, to a uniform wind driving the particles across the beam, and to turbulence. To the extent that differential settling and cross-wind are known, turbulence can be deduced from the measured coefficient of the signal. The results suggest that our persisting ignorance of the precise nature of the particles and of their fall speeds aloft in general precludes a sufficiently accurate estimation of the settling effect, and thus of the turbulence. Relative estimates of the turbulent wind in snow cells and trails are, however, possible. Considerations based on the theory developed suggest that measurements of turbulence in rain or snow in the horizontal beam of a high-resolut on radar at close range should be feasible. *Subject Headings:* **1. Radar echoes from snow 2. Turbulence calculations.**—*Authors' abstract.*

8.4–88 551.501.81:551.594.221

Ligda, Myron G. H., **The radar observation of lightning.** *Journal of Atmospheric and Terrestrial Physics*, 9(5/6):329–346, Nov. **1956.** 19 figs., 21 refs. **DWB**—A series of radar-scopes showing echoes from lightning on a horizontally scanning system are reproduced, with an illustration of how a discharge 10 mi long at a range of 100 mi would appear on a radar screen. One photo shows an echo from a discharge over 100 mi long. The source of the echo is an ionized column, the critical ion density increasing with decreasing wave length. The geometry of radar detection is set out. Discharges detected are cloud-ground, cloud-cloud and in-cloud, mostly at high levels; echoes are classified in 8 types. In about ¼ of the records there was also evidence of signals radiated by the discharge itself. Suggestions are made for future work. *Subject Heading:* **1. Radar echoes from lightning.**—*C.E.P.B.*

8.4–89 551.501.81:551.515

Stout, G. E. and Hiser, H. W., **Radar scope interpretations of wind, hail, and heavy rain storms between May 27 and June 8, 1954.** *American Meteorological Society, Bulletin*, 36(10): 519–527, Dec. **1955.** 15 figs., 12 refs. **DWB**—The value of radar observations in severe weather studies was investigated during a series of storms from May 27 to June 8, 1954 by comparing simultaneously observed field data with radar scope images. PPI photographs, synoptic charts and isohyetal charts are presented; heavy rainstorms, squall lines, tornadoes, hailstorms and windstorms recorded at Champaign, Ill. *Subject Heading:* **1. Radar weather studies.**—*I.L.D.*

8.4–90 538.56:541.12 551.501.83

Piccardi, Giorgio, **Gli studi sui test chimici dal 1° aprile 1955 al 31 marzo 1956.** [Studies on the chemical tests from April 1, 1955 to March 1956.] *Geofisica e Meteorologia*, Genoa, 4(1/2):22–24, Jan./April **1956.** 2 figs., refs. Also: Piccardi, G. and Cini, R., **Azione di un campo elettromagnetico della frequenza di 10 KHz sul test chimico: il problema dell'influsso degli atmosferici.** [Effect of a 10 KHz electromagnetic field on the chemical test: the effect of sferics.] *Ibid.*, p. 25–26. 2 figs., refs. **DWB**—The author's chemical test aimed at the detection of astrophysical or terrestrial electromagnetic radiation effects on inorganic reactions (hydrolysis of bismuth oxychloride) has been under experimentation for five years and reports on its results appeared in several publications. In the first of these two papers some recent recordings are discussed and graphically presented. They show a close correlation between bismuth oxychloride precipitation rate and solar activity, electromagnetic radio-frequency radiation, etc. In the second paper an experiment is described in which an electromagnetic field was found to have a retardatory effect on bismuth oxychloride precipitation rate. It is suggested that this effect may be of interest from the point of view of meteorological research, as the electromagnetic frequency (10 KHz) selected for the experiment is that of natural

sferics. *Subject Headings:* **1. Chemical effects of radio-frequency radiation 2. Sferics effects.** —*G.T.*

8.4–91 551.501.9:061.1(71)

Archibald, D. C. (*Supt., Basic Weather Services, Canada*), **Basic weather services.** *Weatherwise*, Boston, 9(2):42 44, April **1956.** 2 photos. **DWB**—Notes on the ship reporting service, the land stations, upper air stations, remote Arctic stations, mountain stat ons (one at 8,000 ft between Vancouver and Lethbridge), special sea-ice, micrometeorological, permafrost, snow study, and ocean weather ship stations operated by the Canadian Weather Service. The article is written from the point of view of a field station inspector and tells some about the inspection service. Earliest records in Canada were at Prince of Wales, Fort Churchill, Manitoba in 1768 and 1769 (pressure and temperature). *Subject Headings:* **1. Canadian weather service 2. Weather station inspection 3. Weather stations 4. Canada.**—*M.R.*

8.4–92 551.501.9:551.584(782)

Lettau, Heinz, **Die bisher grösste Felduntersuchung zum Problem der Mikrometeorologie, I, Aufgabenstellung und Planung.** [The greatest field investigation up to the present into the problem of micrometeorology, Pt. 1, Site and planning.] *Umschau*, 56(23):724–727, Dec. 1, **1956.** 5 figs. **DLC**—Investigation of the heat balance of the earth's surface needs a wide flat expanse with uniform subsoil and stable weather. Author explored N. America by auto and airplane, with the support of G.R.D., and selected a site in Nebraska. A sq.mi. was leased and buildings erected for a staff of 80. A line of masts and a 16 m tower were erected for profiles of meteorological elements, extended to 2000 m by captive balloons, radiosondes and airplanes. Simultaneous winds to 1300 m are given by a chain of smoke clouds photographed by 2 cameras, and at night by pilot balloon swarms. An air photo and plan are given. Unfortunately Dr. G. Loeser, who did much to develop the project, met with a fatal accident the day before the official opening. *Subject Headings:* **1. Micrometeorological research 2. O'Neill Project, Nebraska 3. U. S. Air Force Geophysics Research Directorate.** —*C.E.P.B.*

8.4–93 551.501.9:551.584(782)

Lettau, Heinz, **Die bisher grösste Felduntersuchung zum Problem der Mikrometeorologie, II, Ergebnisse.** [The greatest field investigation up to the present into the problem of micrometeorology, Pt. 2, Results.] *Umschau*, 56(24):753–755, Dec. 15, **1956.** 9 figs., 7 refs. **DLC**—This part describes the results of observations at the O'Neill site (*see* 8.4–92). Diagrams show temperature profiles from 2500 m above to 80 cm below the surface at 4 hr intervals during a night, amplitude and time of maximum of 24 hr temperature wave at different heights (0 980 m), surface friction (with illustrations of apparatus), horizontal and S and W wind components at 100–1700 m. The latter show a strong nocturnal wind at about 400–600 m. Many other observations have been made and are being dealt with by an automatic tabulator at Iowa State College. *Subject Headings:* **1. Micrometeorological research 2. O'Neill Project, Nebraska 3. U. S. Air Force Geophysics Research Directorate.**—*C.E.P.B*

OBSERVATIONAL DATA

See also: **Monthly mean sea level data** (Ger. Deuts. Wetterdienst), 8.4–22; **Nanga Parbat, Met.,** (Flohn), 8.4–28; **French Greenland Station, Met. obs.** (Expéd. Polaires Françaises), 8.4–30; **Airport usability based on met. obs.** (Škoda), 8.4–63; **Hail echoes on radar** (Harrison), 8.4–86; **Correlation of air pollution with weather factors** (Baynton), 8.4–149; **Annual weather tendencies** (Rodewald), 8.4–222; **Upper air wind, Japan** (Yamada et al.), 8.4–244.

8.4–94 551.506:551.55(96) 551.506:551.557(96) 551.506:551.524(96)

*Korshover, Julius, **Mean winds over the Marshall Islands, May 1951.** California. University at L. A. Institute of Geophysics. Oahu Research Center, Contract AF 19(604)-546, Scientific Report, No. 10, March **1955.** 21 p. 39 figs., 17 tables, 3 refs. Also his: **Mean monthly winds and temperatures over the Marshall Islands in the spring of 1954.** California.

Univ. Institute of Geophysics. Oahu Research Center, Contract AF 19(604)-546, Scientific Report, No. 14, Vol. 1–2, Oct. **1955.** 2 v. in one. Vol. 1, (8 p.), 123 figs., 7 refs. Vol. 2, unpaged. entirely tables. **DWB**—This report summarizes, chiefly in diagrammatic form, the mean monthly atmospheric motion over the Marshall Islands during the month of May and spring 1951, and the months of Feb. March, April, and May, 1954, respectively; and a summarization of the mean atmospheric motion for the spring season of 1954. Charts, depicting the mean field of motion at numerous horizontal levels from 2,000 ft to 90,000 ft are included. Cross-sections, approximately along the 167°E meridian, from 0° to 20°N show the variation with height, up to 90,000 ft, of the mean zonal and meridional components of the wind, the mean wind speed, the resultant wind speed, and the steadiness of the wind. Mean monthly soundings for selected stations and cross sections of the monthly mean temperature are also included. (For March 1951, and Oct. and Nov. 1952, *see* 6.2–41, Feb. 1955, *MAB.*) *Subject Headings:* **1. Wind data 2. Upper air wind data 3. Wind components 4. Temperature data 5. Marshall Islands. I. California. Univ. at L. A., Institute of Geophysics. Oahu Research Center II. Contract AF 19(604)-546.**—*Author's abstract.*

8.4–95 551.506:551.521.11:551.576(485)

*Lindholm, F. (*Swedish Met. and Hydrol. Inst.*), **Sunshine and cloudiness in Sweden, 1901–1930.** *Geografiska Annaler*, Stockholm, 37(1/2):1–50, **1955.** 15 figs., 8 plates, 18 tables, 25 refs. **DLC**—This thorough and comprehensive investigation of the solar climate of Sweden contains extensive data presented in tables, graphs and isoline charts. The discussion includes a description of the sunshine recordings and a list of heliographic stations in Sweden, monthly sums of recorded hours of sunshine for the period of 1930–1949 and reduction of shorter series to the 20 year period, the influence of the terrestrial horizon on the recorded duration of sunshine, monthly and yearly mean values of the relative duration of sunshine and of the recorded duration of sunshine reduced to open horizon, 1930–49, daily variation of sunshine duration, frequency of daily sunshine duration, a description of the cloudiness data, geographical distribution of cloudiness in Sweden, the distribution of insolation in Sweden including the relation between sunshine and cloudiness duration, and the mean number of hours of sunshine during every month, 1901–1930. *Subject Headings:* **1. Solar climate 2. Sunshine duration 3. Cloudiness data 4. Normal period 1901–1930 5. Sweden.**—*I.L.D.*

8.4–96 551.506(023)(497.1)

Miles, M. K., **A meteorologist in Yugoslavia.** *Weather*, 11(12):385–387, Dec. **1956.** fig. **DWB**—Chatty account of weather during a visit to Yugoslavia in March 1956 to attend meeting of European Region of W.M.O. A cold pool lay over the country. Bora, Jugo and Košava were experienced. *Subject Headings:* **1. Weather conditions 2. Yugoslavia.** —*C.E.P.B.*

8.4–97 551.506.1(44)

*France. Météorologie Nationale, **Bulletin Annuel du Service Météorologique de la Métropole et de l'Afrique de Nord, 1949.** [Annual Bulletin of the Meteorological Service of France and of North Africa, 1949.] Paris, **1955.** 2 v. Pt. 1, **Météorologie générale.** 115 p. numerous charts. Pt. 2, **Tableaux climatologiques.** 539 p. map (col. fold.). almost entirely tables. **DWB**—Pt. I contains a collection of 12 monthly summary bulletins with numerous charts covering France or Western Europe, and a discussion of the weather period by period (5-day to 2-week periods). Air mass types, frontal positions, circulation types, temperature and precipitation anomalies, surface and 500 mb centers of action over Atlantic and Europe, and general weather conditions in France are covered in charts and text. Pt. II comprises a voluminous computation of daily or monthly climatic data for 1691 stations of all types in France with coordinates, pressure, temperature and departures (from 1901–30), number of days of frost, precipitation and number of days, relative humidity, sunshine hours, cloudiness, ceiling, visibility, wind (direction, speed, frequency, 6, 12 and 18 h, maximum wind), and snow or rain precipitation and departure from 1901–30 average. A large colored topography map shows location of all stations. *Subject Headings:* **1. Annual climatic data summaries 2. Monthly weather reports 3. France.**—*M.R.*

8.4–98 551.506.1(675)

*Institut National pour l'Étude du Congo Belge, Brussels, **Bulletin climatologique annuel du Congo Belge et du Ruanda-Urundi, 1954–1955.** [Annual climatological bulletin of the Belgian Congo and Ruanda-Urundi, 1954 and 1955.] Its *Bureau Climatologique, Communication*, No. 10 and 12, pub. **1955** and **1956**. About 160 p. each. maps. almost entirely tables. **DWB, DLC**—Data on rainfall, air and soil temperature, vapor pressure, relative humidity, sunshine, and evaporation during 1954 and departures from 1930–49, or 1940–49 means are tabulated for 1 or more fixed hours for each month of 1954 in this publication (begun in 1950 and continued for 1951, 1952 and 1953). Soil temperatures are given for 06, 09, 12, 15 and 18 h for depths of 10, 20 and 50 cm. for 22 stations. Precipitation data are given for 608 stations, temperature for 148, sunshine for 52 stations, humidity for 64 stations, evaporation for 37 stations using Piché evaporimeter with a Richard ring, and 75 stations using a Piché evaporimeter with a Casella ring. Monthly peculiarities of rainfall and maps showing 1st and 2nd half of year anomaly zones, are included in Pt. II. *Subject Headings:* **1. Annual meteorological-data summaries 2. Soil temperature data 3. Belgian Congo.**—*M.R.*

8.4–99 551.506.1(528) 551.582.2(528)

*Japan. Central Meteorological Observatory, Tokyo, **Meteorological data of Ishigaki-Shima and Miyako-Jima: monthly report for the period Jan. 1952–Feb. 1955.** Trans. prepared by Engineer Intelligence Div., Office of the Engineer, Headquarters U. S. Army Forces, Far East. Tokyo, Dec. **1955.** 2 p. of tables (fold.). **DWB**—Monthly means, etc. of pressure, temperature, wind, precipitation and relative humidity for the two island stations are tabulated for each month of the period Jan. 1952 to Feb. 1955 inclusive, but not summarized by the year. Some data are missing. *Subject Headings:* **1. Climatic data for Japanese islands 2. Observational data 3. Ishigaki-Shima, Japan 4. Miyako-Jima, Japan.**—*M.R.*

8.4–100 551.506.2(426):63

Mann, H. H., **Woburn Experimental Station.** *Rothamsted, England. Experimental Station, Report* 1955:175–181, **1956.** table. **GB-MO**—A monthly summary of weather is given for Oct. 1954–Dec. 1955, and effect of drought of July–Sept. is described, including results of irrigation. *Subject Headings:* **1. Agrometeorological stations 2. Weather summaries 3. Woburn, England.**—*C.E.P.B.*

8.4–101 551.506.3:551.575.36(45)

*Moja, Mario, **La nebbia a Milano: risultati di 120 anni di osservazioni.** [Fog at Milan: results of 120 years of observation.] *Geofisica e Meteorologia*, Genoa, 3(6):145–152, Nov./Dec. **1955.** 4 figs., 10 tables, 3 refs. **DWB**—In this statistical analysis of days with fog in Milan for the period 1835–1954, the following values are tabulated and graphically represented: number of days with fog in each year (max. 161 in 1876, min. 23 in 1923); number of days for each month by 5-year periods and for the whole period (max. in Dec., min. in June); distribution by 20-year periods; monthly means by 5-year periods; monthly probabilities; extremes of fog occurrence by months (for example: 31 days in Jan. and 27 days in Feb. 1876, 29 days in Nov. and 30 days in Dec. 1878; no fog in a total of 65 years in April, 75 years in May, 89 years in June, 84 years in July, 75 years in Aug., etc.); consecutive days with fog (1915–54); diurnal distribution and intensity of fog (1953–54); and relation of fog occurrence to relative humidity. *Subject Headings:* **1. Fog frequencies 2. Long period records 3. Milan, Italy.**—*G.T.*

8.4–102 551.506.7(058)(471.4)

*Finland. Ilmatieteellinen Keskuslaitos, **Aerologiset Havainnot, 1942–1943.** [Aerological observations, 1942–1943.] Its *Suomen Meteorologinen Vuosikirja*, Vol. 42/43, 1942/1943, Pt. 3, pub. **1954.** 188 p. almost entirely tables. **DLC**—Radiosonde data from Ilmala (60°12′N), Äänislinna (61°45′N), Nünisalo (61°52′N), Kananainen (65°45′N), Vaarala (65°17′N) and Rovaniemi (66°30′N), and pilot balloon data for Ilmala, Turku, Tampere, Sodankylä, Mustamäki, Kivennapa, Kauhava, and Luonetiärvi are tabulated for the standard levels and isobaric surfaces (1000–50 mb) and for the significant points, for each observation in 1942 and 1943. The Väisälä (Finnish) radiosonde with an ascension rate of 300 m/min.,

and hydrogen filled pilot balloons with 150–180 m/min. rate of ascent were used. (For 1944/47 issues, *see* 4E–145, May 1953, *MAB.*) *Subject Headings:* **1. Upper air data 2. Aerological yearbooks 3. Radiosonde data 4. Finland. I. Rossi, Veikko** (*ed.*).—*M.R.*

8.4–103 551.506.7:551.513:551.501.7

van Loon, Harry, **A note on meridional atmospheric cross sections in the Southern Hemisphere.** *South Africa. Weather Bureau, Notos,* 4(2):127–129, **1955.** 2 figs., 3 tables, 4 refs. **DWB**—Meridional atmospheric cross sections for 0–17 km for 10°–80°S and for the summer and winter seasons presented here (constructed by means of data from different parts of the South Indian Ocean and combined Antarctic data and therefore necessarily of a preliminary character), exhibit certain differences from those published for the Australasian sector. No double maximum shows up in the mean zonal winds, and the seasonal displacement of the single maximum is of the order of only three degrees of latitude. In the winter season, wind velocity continues to increase above the 200-mb level in middle and high latitudes in contrast with the summer conditions. *Subject Headings:* **1. Meridional cross sections 2. Southern Hemisphere.**—*Author's abstract.*

8.4–104 551.506.8:634.8

Garnier, Marcel, **Contribution de la phénologie a l'étude des variations climatiques.** [Contribution of phenology to the study of climatic variations.] *La Météorologie,* Paris, Ser. 4, No. 40:291–300, Oct./Dec. **1955.** 3 figs., 10 refs. English and Spanish summaries p. 291. **DWB**—Mean temperatures in Paris are compared, using 5-year moving averages, with grape harvest dates in the Paris region and in Burgundy as well as with the dates of blossom opening of four plants in the Saint-Maur park. The writer shows that this method makes it possible to correct doubtful temperature values in Paris as published by RENOU in 1887 and to interpret a number of anomalies. *Subject Headings:* **1. Phenological observations 2. Vineyard phenology 3. Paris, France.**—*Author's abstract.*

INSTRUMENT CARRIERS

See also: **Earth satellites, research vehicles** (Franklin Inst.), 8.4–3; **Satellite uses** (Van Allen), 8.4–6; **Satellite for research** (Montefinale), 8.4–56; **Satellite project** (Newell), 8.4–57; **Satellites, importance in study of atmosphere** (Vassy), 8.4–58; **Satellites for physicists** (Singer), 8.4–59; **Rocket grenade experiment** (Groves), 8.4–81; **Smoke puff instruments** (Randall, Clark), 8.4–116.

8.4–105 551.501.7:551.507.321.2(26)

Anderson, Albert D. and Mastenbrook, Henry J. (*both, U. S. Naval Res. Lab.*), **A new upper air data system—the transosonde.** *American Meteorological Society, Bulletin,* 37(7): 342–350, Sept. **1956.** 5 figs., table, 12 refs., 6 eqs. **DWB**—A new concept of upper-air data collection utilizes instrumented balloons controlled to float along given constant-pressure surfaces in the atmosphere. A system of instrumentation, named the transosonde (trans-oceanic-sonde) has been developed for implementing this concept. Field tests have established the technical and meteorological feasibility of the system. In the course of the tests, transosonde balloons were tracked over distances of thousands of miles using a network of shore-based high-frequency radio-direction-finder stations. Emphasis has been placed upon the trajectory of the balloon as the primary source of meteorological data. Wind velocities and accelerations can be derived directly from constant-pressure surface trajectories, providing valuable synoptic and research data. Balloon trajectories in passing through major troughs and ridges define these features, giving information of importance for synoptic analysis and long-range forecasting. In addition, a sequence of trajectories provides a measure of the acceleration and deceleration of these entities. The transosonde system has additional data-gathering potentials for temperature, lapse rate, wind shear and other parameters. It is concluded that the system can be employed over those regions of the globe where upper-air data are lacking at a cost competitive with present-day systems. *Subject Headings:* **1. Transosondes 2. Constant level balloons.**—*Authors' abstract.*

8.4–106 551.507.321.4:551.508.762(02)

Canada. Meteorological Div., **Ceiling balloon equipment.** Its *Cir.* 2689, Ins. 70; Manual, No. 71, July 29, **1955.** 12 p. 3 figs. **DWB**—A manual for use in the Canadian Meteorological Service, consisting of instructions for care, filling and use of ceiling balloons, and equipment in determining cloud height. *Subject Headings:* **1. Ceiling balloon equipment 2. Instrument manuals.**—*M.R.*

8.4–107 551.507.362:551.515.2

Pressly, E. C.; Smith, C. P. and Townsend, J. W., Jr., **Aerobee-hi report No. 1, the RTV-N-10b firing.** *U. S. Naval Research Laboratory, NRL Report* No. 4576, *Upper Atmosphere Research Report,* No. 24, Sept. 8, **1955.** 33 p. 16 figs., 3 tables, 4 refs., 13 eqs. **DWB**—A modified RTV-A-1A aerobee was successfully fired on Oct. 5, 1954 to obtain data for use in designing and developing the Aerobee-Hi rocket. A camera loaded with color film obtained a picture of a tropical cyclone in the Rio Grande Valley. The rocket reached 98 miles. Details of design, instrumentation, firing, descent of equipment, performance, etc. are given in text, graphs, photos. A wind of 1 mph is said to vary point of landing by >3 miles. Hence balloon runs must be made frequently for 5 hours, before firing. If winds were constant to 100,000 ft, 75% of effect on trajectory would occur in first 2000 ft above ground. *Subject Headings:* **1. Aerobee rocket firings 2. Rocket hurricane photographs 3. Rocket instrumentation 4. White Sands, N. Mex.**—*M.R.*

INSTRUMENTS

See also: **High altitude radiosonde flights** (Lowenthal, Arnold), 8.4–25; **Ceiling balloon equipment** (Canada. Met. Div.), 8.4–106; **High-altitude wind measurement** (Anderson, Hoehne), 8.4–241; **Atmos. waves** (Corby), 8.4–248; **Whistlers** (Storey), 8.4–339.

8.4–108 551.508.21:551.521.63

Parker, C. A. and Hatchard, C. G., **Photolysis of potassium ferrioxalate solutions: precise values of quantum efficiency.** *Holton Heath, England. Admiralty Materials Laboratory, Report* No. A/52(M), May **1956.** 15 p. 2 figs., 6 tables, 10 refs. Mimeo. **GB-MO**—Photodecomposition of potassium ferrioxalate in sulphuric acid by filtered light of 12 wavelengths 579–254 mμ was compared with a uranyl oxalate standard and a calibrated thermopile. It is concluded that potassium ferrioxalate is ideal for a general purpose chemical actinometer, having high sensitivity, precision, long wavelength range, stability and simplicity. Operation and calibration are described. *Subject Headings:* **1. Actinometry 2. Potassium ferrioxalate actinometer.**—*C.E.P.B.*

8.4–109 551.508.25:551.508.98:551.584.61

Predmerszky, Tibor, **A hősugárzás mérése melegüzemekben katatermometria segítségével.** [Katathermometric measurement of thermal radiation in hot workshops.] *Időjárás,* Budapest, 60(1):17–25, Jan./Feb. **1956.** 6 figs., table, 5 refs., eqs. Russian and German summaries p. 17. Text in English p. XI–XVI. **DLC**—It is shown that not only cooling but warming also can be measured by means of katathermometers. Thus the field of application of this instrument in industrial hygiene is considerably broadened. According to the experiments reported the intensity of heat radiation from a directional source may be determined with a katathermometer. Environmental thermal radiation is determined in terms of mean radiation temperature which can be calculated from measurements obtained with a dry and a metal katathermometer. *Subject Headings:* **1. Radiation measurement 2. Katathermometers 3. Workshop radiation climate.**—*Trans. of author's abstract.*

8.4–110 551.508.26

British Standards Institution, **Reference thermometers for field use.** Its *British Standard* 2736:**1956.** 7 p. fig., table. **GB-MO**—Specifications are given for a mercury-in-glass solid stem thermometer filled with inert gas, types of approved glass, graduation (°F) and figuring. *Subject Heading:* **1. Standard thermometers.**—*C.E.P.B.*

8.4–111 551.508.29:621.315

Canada. Meteorological Div., **The M.S.C. remote temperature indicator.** Its *Cir.* 2704, Ins. 71, Sept. 27, **1955.** 4 p. fig. **DWB**—Instrument described and illustrated

consists of a thermistor sensing element with a silver casing and a Wheatstone Bridge indicator with a Bach-Simpson galvanometer. Leads as long as 300 ft can be used without allowing for resistance of cable. It can be used as a wet bulb in nonfreezing weather. *Subject Heading:* **1. Telethermoscopes.**—*M.R.*

8.4–112 551.508.29:621.317.33

Warshawsky, I. (*U. S. NACA, Lewis Flight Propulsion Lab., Cleveland*), **Multiple-bridge circuits for measurement of small changes in resistance.** *Review of Scientific Instruments*, N. Y., 26(7):711–715, July **1955.** 5 figs., 1 table, 12 refs., numerous eqs. **DWB, DLC**—In the multiple-bridge circuit, first-order effects of random resistance variations occurring at the junctions of a Wheatstone bridge are eliminated by an extension of Kelvin's method, which involves adding an auxiliary resistor pair at each bridge corner at which the variations occur. The remaining second-order error, and the effects of thermals, are evaluated. The multiple-bridge technique makes possible precise resistance comparisons, and the accurate measurement of small changes in resistance of an element that is connected through switch contacts, or brushes and sliprings. Some numerical design data are given. Elaborations of the basic circuit, and typical applications, including measurements with resistance strain gauges, are described. *Subject Headings:* **1. Electrical resistance measurement 2. Resistance thermometers.**—*Author's abstract.*

8.4–113 551.508.4

Frederick, Carl L. et al., **Automatic pressure measuring systems used with high-speed wind tunnels.** *AGARDograph*, Paris, No. 10, June **1955.** 51 p. numerous figs. (incl. photos), 24 refs. **DLC**—Pressure in high speed wind tunnels is measured by: 1) liquid columns (manometers), 2) metal diaphragms, 3) Bourdon tube, 4) metal bellows, 5) hot wire filaments and 6) elementary particle radiation (ionization). Application, advantages, and disadvantages of each construction and operation of many high sensitivity devices in laboratories of the U.S.A. (Applied Physics Lab. at Silver Spring, Md; Aerophysics Laboratory of North American Aviation Co.; and Consolidated Engineering Corp, Pasadena) are discussed and amply illustrated with photos, line drawings and calibration curves. *Subject Heading:* **1. Pressure measuring devices.**—*M.R.*

8.4–114 551.508.53/4

Kassander, A. Richard, Jr. (*Inst. of Atmospheric Physics, Univ. of Arizona*) and Stewart, Robert M., Jr. (*Physics Dept. Iowa State College, Ames, Iowa*), **A simple low-inertia anemometer of the three cup type.** *American Meteorological Society, Bulletin*, 36(8):384–389, Oct. **1955.** 7 figs., (incl. photo), 2 refs. **DWB.** Also: Kassander, A. Richard, Jr.; Stewart, Robert M., Jr. and Falk, Harold [article of same title], Iowa State College, Dept. of Physics, Contract AF 19(122)-440, Scientific Report, No. 3, April 1, **1954.** (*See* 6.4–59, April 1955, *MAB.*) **MH-BH**—The authors describe design, construction and testing of a three cup wheel anemometer which is constructed of the halves of "ping pong" balls. A photograph of the assembled anemometer, a diagram of the anemometer unit, and circuit diagrams of the pre-amplifier unit, recording unit are presented. This anemometer is characterized by simple construction, "ease of recording, low starting speed and rapid response." *Subject Heading:* **1. Anemometers.**—*I.L.D.*

8.4–115 551.508.53/4 551.556:69

Nishimura, Genrokuro and Suzuki, Masazi, **Anemometer of inverted pendulum type and wind construction studied with it.** *Tokyo. Univ. Earthquake Research Institute, Bulletin*, 32(3):313–339, Sept. **1954.** 20 figs., 5 plates, 5 tables, 4 refs., 10 eqs. In English; Japanese summary p. 339. **DWB**—An elaborate study was made to determine the most suitable anemometer for measuring wind pressure against wooden houses or factories, and to determine the characteristics (in a wind tunnel) of the developed anemometer. Finally, a detailed observational analysis of records produced on the roof of a warehouse at Inatori-machi in Shizuska Prefecture is presented, showing the relationships between period of wind gusts of 0.1 to 30 sec duration and of peak gusts, pressure of maximum gusts and direction of wind (SW winds come over rough terrain, NE winds over the sea). The inverted pendulum ane-

mometer is illustrated. No typhoon winds were encountered, as the records were all made in winter and spring (monsoon season) of 1940–41. *Subject Headings:* **1. Inverted pendulum anemometers 2. Wind pressure on buildings 3. Gust velocity analysis 4. Wind pressure in tunnels 5. Shizuska Prefecture, Japan.**—*M.R.*

8.4–116 551.508.59:551.507.352

Randall, D. L. and Clark, A. B. J. (both, *Naval Res. Lab., Wash., D. C.*), **A radio-command-control puffer for studying airflow.** *American Meteorological Society, Bulletin*, 36(5): 224–227, May **1955.** 5 figs., 7 refs. **DWB**—A description of a model airplane command control system applied to the method of photographing controlled smoke puff in order to find the airflow at a tethered-balloon level. A schematic diagram of the principal components of the radio-command-control smoke-puffer system and photographs of the individual components are presented and its use is illustrated. *Subject Headings:* **1. Upper air wind instruments 2. Smoke puff instruments 3. Airplane instrumentation.** —*I.L.D.*

8.4–117 551.508.71:551.571

Tanner, C. B. and Suomi, V. E., **Lithium chloride Dewcel properties and use for dew-point and vapor-pressure gradient measurements.** *American Geophysical Union, Transactions*, 37(4):413 420, Aug. **1956.** 10 figs., table, 4 refs. **DWB, DLC**—The lithium chloride Dewcel covered under the Foxboro Company Patent Number 2,359,278 has been modified slightly and used to measure small dew-point or vapor-pressure gradients above a crop. The advantage of the Dewcel is that the relative error of the measurement is the same at all dew points and that Dewcel data are conveniently reduced to dewpoint and vapor-pressure data. The disadvantage of the Dewcel is its large absolute error which often may be as large as the dew-point gradient measured. The Dewcel modification and the equipment for excluding the absolute error of the Dewcels from the dew-point gradient measurement are reported. In order to operate the Dewcel suitably, several of the Dewcel characteristics have been determined. The effect of ventilation and changes in air temperatures upon the Dewcel temperature and the slope of the dew-point -Dewcel-temperature curve at various Dewcel temperatures above ambient are given. Two methods for Dewcel calibration are reported. A scheme for generating constant dew-point air at rates of 20 liters per minute is given. *Subject Headings:* **1. Lithium chloride hydrometers 2. Dewcel 3. Dew point gradient measurement.**—*Authors' abstract.*

8.4–118 551.508.761:778.38

Kassander, A. Richard, Jr. and Sims, Lee L., **Cloud photogrammetry with ground-located K-17 aerial cameras.** *Journal of Meteorology*, 14(1):43–49, Feb. **1957.** 6 figs., 4 refs., 6 eqs. Also issued as *Arizona Univ. Institute of Atmospheric Physics, Scientific Report* No. 2, June 1, **1956.** 13 p. 6 figs. (incl. photos), 4 refs., 5 eqs. **DWB**—A technique is presented in which a pair of ground-located K-17 aerial cameras are used on a 1.30 mile baseline to determine cloud ranges to one mile accuracy at 40 miles and cloud height measurements to within 500 feet at this range. Details of the power supply, vacuum supply, and camera synchronization requirements are discussed as well as methods used in analysis. In particular, a detailed discussion is given of the theoretical and practical errors encountered in such a photogrammetric technique. *Subject meadings:* **1. Cloud cameras 2. Cloud photogrammetry.** —*Authors' abstract.*

8.4–119 551.508.77:551.578.11

Spencer, A. T. and Blanchard, D. C., **An automatic raindrop sampler.** Woods Hole Oceanographic Institution, Contract Nonr-798(00), Technical Report, No. 11, Jan. **1956.** 8 p. 6 figs., 13 refs. **DWB**—An automatic drop recorder 6″×8″×11″ weighing 12 lbs and modeled after the moving-type sampler of D. C. Blanchard (*see item* 5.9–72, Sept. 1954, *MAB*), was designed for use in obtaining information on changes in drop size in trade wind (warm cloud) showers moving up the slopes of the Hawaiian Islands. The tape consisted of $3\frac{1}{2}$″ wide adding machine paper impregnated with dry methylene blue chloride powder. Drops as small as 30μ diameter can be detected with a microscope. A 2 or 3 second exposure allows 60 to 200 drops to be collected. Calibration methods and results of 5,000 separate samples are mentioned. A decrease in maximum drop size occurs with increased altitude. The

device would not be much good for thunderstorm showers where drops are >15 mm. diameter. *Subject Headings:* **1. Raindrop size samplers 2. Warm cloud drop size.**—*M.R.*

8.4–120 551.508.822:551.524:551.508.4

Pauly, E., **Zur Temperaturkorrektion der Druckmessung mit der Radiosonde H 50.** [Temperature correction of pressure measurement with the H 50 radiosonde.] *Germany. Deutscher Wetterdienst. Instrumentenamt Hamburg, Technische Mitteilungen des Instrumentenwesens des Deutschen Wetterdienstes*, New Ser. No. 2:21–30, **1956.** 9 figs., table, 5 refs., 7 eqs. **DWB** –A detailed analysis of experimental measurements made with H 50 radiosondes having temperature compensation equipment (but not bimetal temperature compensation) leads to the conclusion that pressure elements of each sonde have to be adjusted individually for temperature effects. (For further details *see* 7.8-78, Aug. 1956, *MAB.*) *Subject Headings:* **1. Temperature effects on radiosonde pressure 2. Radiosonde calibration.**—*G.T.*

8.4–121 551.508.822

Ramachandran, S. and Mani, Anna (both, *Met. Office, Poona*), **The F-type rawinsonde.** *Indian Journal of Meteorology and Geophysics*, Delhi, 7(2):161–164, April **1956.** 3 figs., 5 refs. **DWB, DLC**—Details of a method whereby it is possible to get satisfactory records of the F-type radiosonde signals for computing upper air winds and temperatures in cloudy weather, with a single tube transmitter. Fading is also reduced by alignment of the ground antenna. The transmitter in the radar (AA No. III, Mk III, 204 Mc) is not used. Upper winds can be obtained to much higher levels than with dipole passive targets whose maximum range is 18–20 km and height 8–10 km. *Subject Headings:* **1. F-type rawinsonde 2. Rawinsonde improvements 3. Indian Meteorological Service.**—*M.R.*

8.4–122 551.508.822:551.521:551.508.2

Schulze, W. and Abild, B., **Zum Strahlungsfehler bei Temperaturmessungen mit Radiosonden.** [Radiation error in temperature measurement with radiosondes.] *Germany. Deutscher Wetterdienst. Instrumentenamt Hamburg, Technische Mitteilungen des Instrumentenwesens des Deutschen Wetterdienstes*, New Ser. No. 2:1–13, **1956.** 11 figs., 5 tables, 14 refs. **DWB**—Data on radiation error (difference between values measured during ascent and descent) in temperature values of bimetal thermocouples in radiosondes are presented. They were obtained in experimental measurements destined to identify a possible effect of the balloon temperature. No significant effect of balloon temperature on the radiation error of radiosonde temperature measurement was found but it appeared that the stability of suspension has such an effect. The radiation error decreases with distance of the radiosonde from the balloon (because of better stability which improves ventilation) and it also decreases with the use of stabilizing ballast. Data on seasonal variation of radiation error are also presented and discussed. *Subject Headings:* **1. Radiosonde errors 2. Radiation effects on temperature measurements.**—*G.T.*

8.4–123 551.508.91:551.575.1

Serpolay, R., **Une technique pour l'analyse des brouillards aqueux ou glacés.** [A technique for analyzing aqueous fogs and ice fogs.] *Puy-de-Dôme. Observatoire, Bulletin*, Ser. 2, No. 2:33–46, April–June **1956.** 7 figs., 10 refs. French and English summaries p. 33. **DWB**—An apparatus is described for precipitating the particles in a measurable volume of air on to the oiled plexiglas stage of a microscope with cinematograph attachment. Plane (×600) and profile (×450) photographs of droplets from a water fog are shown; at −5°C most frequent radius was 2–3μ, identical with that given by spider-web technique. Fogs of ice particles were studied by a modified technique in which air impinged vertically on underside of a glass plate. This was used to study seeding processes with AgI and freezing liquids. *Subject Headings:* **1. Cloud chambers 2. Fog particle investigation.** –*C.E.P.B.*

8.4–124 551.508.96:523.8:621.396.8

Laffineur, M. and Whitehead, J. D., **The measurement of cosmic radio emission for ionospheric studies.** *Journal of Atmospheric and Terrestrial Physics*, 9(5/6):347–349, Nov. **1956.** 2 figs., ref. **DWB**—A technique is described, in use at Meudon Observatory near

Paris, for recording automatically cosmic noise from the Cassiopeia source on 24 Mc/s, in spite of severe local interference. Some records are shown. *Subject Headings:* **1. Cosmic radio frequency radiation 2. Ionospheric recorders.**—*C.E.P.B.*

8.4–125 551.508.94:551.594.12

Kemp, L. A. W., **Guarded-field ionization chambers: a new principle applied to both free-air and thimble versions.** *Nature*, London, 178(4544):1250–1251, Dec. 1, **1956.** 2 figs., 2 refs. **DWB**—A guard-strip system around an ionization chamber is described and illustrated. It has many advantages. *Subject Heading:* **1. Ionization chambers.**—*C.E.P.B.*

SYNOPTIC ANALYSIS AND FORECASTING

See also: **Weather analysis and forecasting** (Petterssen), 8.4–7; **Tropical met., practical aspect** (Palmer et al.), 8.4–14; **Weather forecasting** (Valmar), 8.4–19; **Southern Hemisphere, met. and daily pressure charts** (Le Quinio), 8.4–31; **Single observer forecasting at sea** (Gt. Brit.), 8.4–65; **Synoptic case histories, Canary Is.** (Fort Tullot), 8.4 195; **Effect of air temp. and pressure on AgI decay** (Warner, Bigg), 8.4–262; **Hail, Denver area** (Beckwith), 8.4–279.

8.4–126 551.509:621.397.9

Jehn, K. H. (*Univ. of Texas, Austin*), **The challenge of television weather programs.** *American Meteorological Society, Bulletin*, 37(7):351–353, Sept. **1956. DWB**—The objectives of television weather presentations are reviewed and are seen as a particular challenge to both professional meteorologists and television people. An effort is made to analyze the factors involved in the situation and to suggest possible means of realizing the objectives. *Subject Heading:* **1. Television weather programs.**—*Author's abstract.*

8.4–127 551.509:061.1(71)

McLeod, K. T. (*Met. Service, Canada*), **Public weather services.** *Weatherwise*, Boston, 9(2):45–46 and 50, April **1956.** photo. **DWB**—Before World War II there were only 2 forecast offices in Canada (Toronto and Victoria). Now 7 districts are provided service by centers at Vancouver, Edmonton, Winnipeg, Toronto, Montreal, Halifax and Gander. Some of the duties and problems of the forecast offices and the Public Weather Section of the Head Office are related. *Subject Headings:* **1. Canadian forecast services 2. Public weather service 3. Canada.**—*M.R.*

8.4–128 551.509.1:621.397

McTaggart-Cowan, P. D. (*Met. Service of Canada*), **Integrating facsimile into a weather service.** *American Meteorological Society, Bulletin*, 37(1):22–26, Jan. **1956.** 2 figs. **DWB, DLC**—With special reference to Canada the author discusses the role of facsimil'zed weather maps in the field forecast services, the total area that must be covered by the facsimilized maps either from the standpoint of guidance or operations "whether the facsimile system can operate with a single transmitting station or whether regional transmitters are also required," the production of master copies of the material to be transmitted by facsimile, and the integrations of facsimile into the field office. A map showing the Canadian weatherfax system and the weatherfax schedule are reproduced. *Subject Headings:* **1. Facsimile map transmission 2. Weatherfax 3. Canadian Weather Service.**—*I.L.D.*

8.4–129 551.509.1(26)

Rodewald, M., **Auch Schönwetter-Obse sind wichtig.** [Even fine weather observations are important.] *Wetterlotse*, No. 108:234–236, Nov. **1956.** fig. **DLC**—Weather, especially rainfall, is important for the agricultural countries of Central America, but forecasting is hampered by the lack of ships' observations in fine weather. In San Salvador in Sept. 1956 the number of ships' reports received increased from one day before onset of bad weather (when they were most needed) to two days after onset. Reports from coastal waters are especially valuable. *Subject Heading:* **1. Ships' weather messages.**—*C.E.P.B.*

8.4–130 551.509.312

Estoque, M. A. (*Weather Forecasting Research Center, Chic. Univ.*), **Graphical integrations of a two-level model.** Chicago Univ. Dept. of Meteorology, Contract AF 19(604)-1293, Scientific Report No. 10, May **1956.** 24 p. 5 figs., 61 charts in appendix, table, 2 refs., 11 eqs. Also in: *Journal of Meteorology*, 14(1):38–42, Feb. **1957. DWB**—A prediction model representing a slight modification of a previous model (Estoque, 1956) is presented. The prediction equations were integrated graphically to produce 24-hr 1000 and 500 mb forecasts for the month of Jan. 1953. The results indicate that the method may be of considerable value in routine forecasting, particularly in regions where orographic influences are no great concern. *Subject Headings:* **1. Numerical forecasting 2. Forecasting techniques 3. Two-level forecasting model.**—*Author's abstract.*

8.4–131 551.509.312:551.510.52/3

Knighting, E., **An atmospheric model for numerical integration including the tropopause effects.** *Great Britain. Meteorological Research Committee, M.R.P.*, 1002, Sept. 17, **1956.** 5 p. fig., 2 refs., 13 eqs. Mimeo. **DWB**—The usual atmospheric models for numerical integration of the equations of motion ignore the transition from troposphere to stratosphere. This is illogical and a simple model is developed which includes a variable pressure surface corresponding with the tropopause. Prognostic equations include one for tropopause pressure. *Subject Headings:* **1. Numerical forecasting techniques 2. Tropopause pressure.**—*C.E.P.B.*

8.4–132 551.509.312:551.552:551.542.1

Knighting, E., **A non-geostrophic extension of the Sawyer-Bushby model of the atmosphere suitable for numerical integration.** *Great Britain. Meteorological Research Committee, M.R.P.*, 1003, Sept. 17, **1956.** 4 p. 2 refs., 20 eqs. Mimeo. **DWB**—A two-level model is used in which divergence is not zero at the surface but is zero at 500 mb. Vertical velocity becomes the key to development. Prognostic equations are set out and stream and potential functions introduced. The equations are difficult to solve and some simplifications are suggested. *Subject Headings:* **1. Numerical forecasting techniques 2. Nongeostrophic wind effects 3. Sawyer-Bushby model.**—*C.E.P.B.*

8.4–133 551.509.312:517.512.2

Kurihara, Y. (*Central Met. Ob., Tokyo*), **Regional numerical weather prediction in a barotropic atmosphere by the method of one-dimensional Fourier series with one-dimensional relaxation.** *Meteorological Society of Japan, Tokyo, Journal*, Ser. 2, 33(4):145–152, Sept. **1955.** 4 figs., 2 tables, 10 refs., 20 eqs. **DWB, DLC**—The height change of 500 mb isobaric surface in a barotropic atmosphere is calculated by making use of the coefficients of one-dimensional Fourier series along latitude circles with one dimensional relaxation with respect to latitude. In this paper, the tendency equations concerning Fourier coefficients along latitude circles are derived as a function of latitude from a vorticity equation, and their finite difference expressions are given in order to simplify the calculation. The subjects as to the number of component-waves to be considered and the choice of their interactions were the most important. The problem of error in this method was also considered. *Subject Headings:* **1. Numerical forecasting techniques 2. Fourier analysis.**—*Author's abstract.*

8.4–134 551.509.312:518.4

Petterssen, S.; Estoque, M. A. (*Weather Forecasting Research Center, Chic. Univ.*) and Hughes, Lawrence A. (*U. S. W. B. Forecast Center, Chic.*), **An experiment in prognostication.** Chicago Univ. Dept. of Meteorology, Contract AF 19(604)-1293, Scientific Report No. 12, July **1956.** 32 p. 13 figs., 5 tables, 7 refs., eqs. **DWB**—An experiment was conducted during the period 11 Jan. to 21 Feb., 1956 for the purpose of determining the manner in which graphical integration can best be used in providing prognostic charts for sea level and for the 500 mb level. While the graphical integrations were used as a first approximation, supplementary techniques were applied to obtain final forecasts of the pressure distribution at sea level. The results of the verification are discussed and compared with those pertaining to other forecasting procedures. The geographical distribution of errors is discussed and interpreted. *Subject Headings:* **1. Numerical forecasting techniques 2. Graphical integration.**—*Authors' abstract.*

8.4–135 551.509.317:551.515.8

Baird, Gaylen H., **Composite charts of some synoptic features of squall lines.** N. Y. Univ. College of Engineering. Research Div. Dept. of Meteorology and Oceanography, Contract AF 19(604)-1387, Scientific Report, No. 1, Aug. **1956.** 36 p. 3 figs., 5 tables, 15 refs., eqs. **DWB**—A method of random selection was used to choose twelve squall lines for investigation from the total number of squall lines in the United States east of the 100th meridian from 1950 to 1954. Precautions were taken to minimize bias wherever possible. The purpose of this study was to determine some of the processes involved in the maintenance and structure of squall lines, and to demonstrate these by means of composite charts of some of the synoptic features. Previous investigations have indicated that differential advection is an important process in relation to convective weather. The differential-advection process was investigated and found significant in relation to the twelve squall lines. A composite chart of the relationship was constructed. The synoptic features that were found significant include the frontal system, jet wind patterns, temperature patterns, and wind flow at the 850-, 700-, 500-, and 300-mb levels. The association of these features with the squall line are shown by use of composite charts. The composite charts are offered as typical of squall lines in general, on the assumption that the random selection gave a representative sample of the cases occurring in a five-year period. *Subject Headings:* **1. Squall line forecasting 2. Synoptic aerological studies.**—*Author's abstract.*

8.4–136 551.509.33

Ogawara, M.; Ozawa, T.; Suzuki, E.; Fujita, T. and Tomatsu, T. (all, *Met. Res. Inst., Tokyo*), **Stochastic seasonal weather forecasting: a trial of seasonal prediction for the summer of 1953.** *Meteorological Society of Japan, Journal,* Ser. 2, 32(9/10):253–280, Sept./Oct. **1954.** 8 figs., 13 tables, 25 refs. In Japanese; English summary p. 253–254. **DWB, DLC**—A long and fully illustrated article on statistical forecasting for 3–6 months in advance. Using data prior to March 31, 1953 to forecast July and Aug. temperature and June and July precipitation for the northern part of Kanto (Kwanto) including Maebashi, Kumagaya and Utsunomiya. Long period trends, periodic fluctuations, pressure differences across Eurasia or Arctic; precipitation for Jan. and Feb. of 1953, precipitation for 6–10 previous years, etc. are given. *Subject Headings:* **1. Seasonal forecasting 2. Long range forecasting 3. Northern Kanto, Japan.**—*M.R.*

8.4–137 551.509.33:551.513.7

Schell, Irving I., **On the nature and origin of the southern oscillation.** *Journal of Meteorology,* 13(6):592–598, Dec. **1956.** 3 figs., 13 refs. **DWB**—The oscillation between the Indian Ocean and South Pacific regions is related to but not explained by the effect of a strong (weak) South Pacific high in lowering (raising) tropical sea temperature in the eastern Pacific, and the resulting variations of air temperature, suggested by WALKER and BLISS. Variations of pressure are related to variations of solar radiation (in an obscure way) modified by heat storage in the tropical and southern oceans; the Antarctic also probably plays a part. *Subject Headings:* **1. Long range forecasting 2. Southern oscillation.**—*C.E.P.B.*

8.4–138 551.509.34:551.524.3

Ashmore, S. E. and Richardson, W. E., **Night cooling under clear skies.** *Meteorological Magazine,* London, 85(1013):342–344, Nov. **1956.** 3 refs. **DWB**—ASHMORE gives cases which show that 15°F is not the lowest possible minimum temperature in England without snow cover. At Rickmansworth a minimum of 7°F was found. RICHARDSON agrees that the error was due to faulty extrapolation of his graph (*Met. Mag.*, 84:301, 1955; *see* 8.3–129 March 1957, *MAB*). *Subject Headings:* **1. Minimum temperature forecasting 2. Single station forecasting.**—*C.E.P.B.*

8.4–139 551.509.34:551.574.4

Aujeszky, László, **A harmatképződés előrejelzése.** [Forecasting of dew formation.] *Időjárás,* Budapest, 60(1):26–35, Jan./Feb. **1956.** 11 figs., 5 refs. Russian and French summaries p. 26. **DLC**—The principal factors affecting dew formation are nocturnal cooling rate and dew point. The same factors are involved in radiational freezing; consequently

similar method to the one used in frost forecasting can be applied to dew forecasting. In forecasting changes in dew point the passage of fronts should be given due consideration as even weakly developed fronts may affect radiative conditions and dew point. The paper includes practical rules of dew forecasting for various synoptic situations and three examples of their application to actual cases of weather development over Hungary. *Subject Heading:* **1. Dew forecasting.**—*G.T.*

ARTIFICIAL PRECIPITATION

8.4–140 551.509.6:551.511:623.454.8

Mason, B. J., **Man's influence on the weather.** *Advancement of Science*, London, 12(49): 498–504, June **1956.** fig. **DLC**—The energy of large scale atmospheric processes is so great that they can only be influenced indirectly. The radiation balance in the troposphere is analyzed and the unstable heat and water vapor circulation between low and high latitudes, which determines large scale weather, is described. Weather modification by changing the radiation balance through a dust or artificial cloud layer, triggering of dynamical disturbances or modification of the hydrological cycle is not practicable on a large scale, but reduction of evaporation from water surfaces by monomolecular layers is being tried in Australia. It is unlikely that H-bombs can have more than a local transient effect. Cloudseeding experiments are encouraging but difficult to evaluate. *Subject Heading:* **1. Artificial influences on weather.** —*C.E.P.B.*

8.4–141 551.509.67:551.574.2

Albani, F., **Remarques au sujet de l'influence d'impuretés sur l'activité glaçogène.** [Remarks on the influence of impurities on icing activity.] *Puy-de-Dôme. Observatoire, Bulletin*, Ser. 2, No. 2:59–60, April–June **1956. DWB**—Argues against B. J. MASON's suggestion (*see* 7.9–119, Sept. 1956, *MAB*) that the ice-forming effectiveness of other substances is due to impurities, especially traces of AgI. Sparks between electrodes of various metals produce nuclei effective at temperatures above −4°C, in atmospheres of CO_2 or argon. *Subject Headings:* **1. Condensation nuclei 2. Silver iodide. I. Mason, B. J.**—*C.E.P.B.*

8.4–142 551.509.67:551.574.2

Gardner, Charles, Jr. (*Exec. Sec., Advisory Committee on Weather Control*), **Operation Overseed.** *Mt. Washington Observatory, Gorham, N. H., Bulletin*, No. 28:2 4, Dec. **1955. DWB**—Attempts have been made since Oct. 17, 1955 to show whether or not AgI seeding from ground generators is effective, by an intensive project on and around Mt. Washington, N. H., where supercooled clouds occur 9 months of the year. Several ground generators were located at different places around the peak (observatory). No conclusive answers will be reached until the spring of 1956. The final report, by June 1, 1956, will tell (a) if negative, that such operations are ineffective and (b) if positive, the extent of increment that can be expected. *Subject Headings:* **1. Operation Overseed 2. Silver iodide seeding 3. Artificial precipitation 4. Mt. Washington, N. H.**—*M.R.*

8.4–143 551.509.67:551.574.1

Mossop, S. C., **Sublimation nuclei.** *Physical Society of London, Proceedings, Ser. B*, 69(2):161–164, Feb. 1, **1956.** fig., 4 refs. Also his: **The nucleation of supercooled water by various chemicals.** *Ibid.*, p. 165–174. 4 figs., 2 tables, 17 refs. **DWB**—Cloud chamber experiments in outdoor air show that ice crystals usually form by freezing of water drops, but crystals can grow on some substances by sublimation. In addition to cadmium iodide (discovered by FOURNIER D'ALBE) these are Iceland spar, gypsum and sodium bentonite. The explanation is discussed. The second paper investigates the freezing of supercooled drops by crystals of 10 different substances. Nucleating potency (supercooling for one ice crystal per 10,000 drops) is related to "disregistry," which is the ratio of the difference between the lattice parameters of the crystal and of ice (4.51) divided by 4.51. The relation is fairly close but there are some exceptions which show that this is not the only criterion of nucleating ability. *Subject Headings:* **1. Sublimation nuclei 2. Nucleation theory.**—*C.E.P.B.*

8.4–144 551.509.67

Pire, J., **Essais de stimulation artificielle de la pluie à Tely (Territoire de Poko, Congo belge), janvier 1955.** [Rainmaking experiments at Tely (Poko territory, Belgian Congo), Jan. 1955.] *Belgium. Académie Royale des Sciences Coloniales, Bulletin des Séances*, N.S., 2(2):230–244, **1956.** 3 figs., 6 tables, chart. Introduction by N. Van der Elst, p. 228–229. **DWB**—An analysis of precipitation and cloudiness conditions in the eastern part of Uele district, Belgian Congo, suggests that cloud seeding operations in that region would have a good likelihood of making the rainfall distribution more uniform and thus saving coffee crops which need rain during the blooming period. Experiments conducted from Jan. 8 to Jan. 17, 1955 are reported. The two ground-based AgI generators were put into action on two out of the ten days. On these two occasions cloud development was good but precipitation could not be expected with certainty. On both days precipitation was observed in the target area and did not occur upwind of the generators. *Subject Headings:* **1. Cloud seeding 2. Belgian Congo.**—*G.T.*

8.4–145 551.509.67

Rao, Y. P. and Desai, B. N. (*Regional Met. Centre, Colaba, Bombay*), **Possibilities of artificial rain in the states of Bombay, Saurashtra and Kutch.** (In: Symposium on Artificial Rain, New Delhi, Feb. 1953, [**Proceedings and Papers.**] pub. **1955.** p. 121–126. fig., 2 tables.) **DWB**—The nature of clouds, their frequency and heights of bases and tops in the States of Bombay, Saurashtra and Kutch are discussed, particularly in the light of radiosonde data during the southwest monsoon period when cloudiness is maximum. On the basis of these data, the possibilities of artificially stimulating rainfall from such clouds or augmenting the amount of rainfall that might have been released by natural processes have been considered. In the Deccan and the Western Ghats, clouds suitable for seeding experiments are not infrequent in the monsoon and pre- and post-monsoon periods and there is a possibility of additional rainfall through seeding. In the Konkan, Saurashtra, Gujarat and Kutch, clouds which are considered suitable for seeding generally give rainfall naturally, and there does not seem to be much prospect of appreciably increasing this rainfall by seedings. *Subject Headings:* **1. Cloud seeding 2. Cloud frequencies 3. Cloud height 4. India.**—*Author's abstract.*

STRUCTURE AND PHYSICS OF THE ATMOSPHERE

COMPOSITION OF THE ATMOSPHERE

See also: **Abnormal V.H.F. propagation** (Hooper), 8.4–83.

8.4–146 551.510.3:551.510.4:531.5(211.1)

Sissenwine, Norman and Cole, Allen E., **Extreme atmospheres and ballistic densities.** *U. S. Air Force. Cambridge Research Center, Air Force Surveys in Geophysics*, No. 81, July **1955.** 22 p. 2 figs., 8 tables, 19 refs. **DWB, DLC**—A description of Arctic air from the surface to 100,000 feet is presented. This atmosphere can be used as a typical sounding by designers of vertically rising vehicles or descending bombs. Variations in atmospheric density between air masses and the effect on bomb trajectories, including an example for a typical design, are discussed. It was found that the best approximation of the range of bomb misses due to variations in atmospheric density could be obtained by computing trajectories for each specific bombing operation from 29 typical soundings. These soundings represent most of the air mass types at their source, in transition, and in combinations during each season of the year. Mid-latitude areas of civilization will be subject to most of these soundings with the more northerly ones experiencing polar extremes in the winter and those in the south experiencing tropical extremes in the summer. *Subject Headings:* **1. Air density 2. Atmospheric structure 3. Ballistics 4. Arctic.**—*Authors' abstract.*

8.4–147 551.510.41:546.214

Frenkiel, F. N. (*Applied Physics Lab., Johns Hopkins Univ., Silver Spring, Md.*), **Ozone theory in the troposphere.** *Journal of Chemical Physics*, N. Y., 23(12):2440, Dec. **1955.**

2 refs. **DLC**—This is an abstract of a paper presented as part of the lecture on **Fluid dynamics problems in geophysical sciences,** at the American Physical Society Meeting in Mexico City, Aug. 29, 1955. Present theories attribute atmospheric O_3 to photodissociation in the stratosphere. The author presents evidence that O_3 produced by photodissociation of hydrocarbons and NO_2 in industrial areas could account for the vertical distribution of O_3 in the troposphere. The O_3 could be diffused from industrial areas throughout the country and would be of the order of magnitude of measured values. (For Spanish version of the abstract, *see Pan American Union, Ciencia y Tecnologia,* 5(18):130, July/Sept. 1955.) *Subject Headings:* **1. Ozone in troposphere 2. Photodissociation of hydrocarbons.**—*M.R.*

8.4–148 551.510.41:546.291

†Nicolet, M., **The aeronomic problem of helium.** Pennsylvania. State Univ. Ionosphere Research Laboratory. Contract AF 19(604)-1304, Scientific Report, No. 86, May 15, 1956. 35 p. 4 figs., 4 tables, 31 refs., 35+6 eqs. **DWB**—The escape of helium from the terrestrial atmosphere has been investigated, taking account of the simultaneous presence in the atmosphere of the isotopes helium-3 and helium-4. The generation mechanisms for helium-4 and helium-3 are, respectively, the radioactivity of the earth's crust and the presence of cosmic radiation; they imply contradictory atmospheric temperatures at the thermopause level. If a temperature permitting the escape of He^3 is assumed, an accumulation of He^4 results. If the temperature of the thermopause is such that there is an escape of He^4, this causes the complete escape of He^3 for the region in which diffusion takes place. The process limiting escape is associated with the action of mixing. Under these conditions the atomic flow is proportional to the respective concentrations of He^4 and He^3. Thus, the ratio of the rates of escape of He^4 and He^3 equals the ratio of the production rates, and is consequently equal to the ratio of the concentrations observed in the troposphere. From this it is concluded that the temperature of the thermopause is variable and strongly dependent on solar activity. *Subject Headings:* **1. Helium atmosphere 2. Helium in upper atmosphere 3. Tropopause temperatures.**—*Author's abstract.*

ATMOSPHERIC POLLUTION

See also: **2nd Technical Progress Report** (Air Pollution Foundation), 8.4–21.

8.4–149 551.510.42:551.506(774,713)

Baynton, H. W. (*Met. Service, Canada*), **Multiple correlations of particulate air pollution with weather factors at Detroit and Windsor.** *American Meteorological Society, Bulletin,* 37(7):333–337, Sept. 1956. 3 figs., 2 tables, 6 refs., 4 eqs. **DWB**—For a six week period in 1952, a network of twenty high volume air samplers was used to measure the concentration of particulate pollution in Detroit and Windsor. Using a graphical multiple regression technique, regression curves are obtained which relate particulate pollution directly with temperature anomaly, and 24 hr temperature change, and inversely with wind speed, and duration of precipitation. The relationships were modified for application to independent data covering each of the four seasons. The results appeared useful, although rigorous claims about significance cannot be made where graphical methods are employed. *Subject Headings:* **1. Atmospheric pollution studies 2. Weather effects on atmospheric pollution 3. Detroit, Michigan 4. Windsor, Ontario.**—*Author's abstract.*

8.4–150 551.510.42

Fortney, W. H. (*N. Y. Central Railroad, Indianapolis, Ind.*), **The smoke picture of today.** *Air Repair,* Pittsburgh, Pa., 4(3):118, 130, Nov. 1954. **DLC**—There are 85 cities and towns on the N. Y. Central R.R. system which have smoke ordinances. At the date of writing 75% of the system was dieselized and within 2 years it is to be 100% Diesel. This will reduce smoke nuisance. Carelessness of engineers unfamiliar with coal burning and smoke reduction methods is partly responsible for what remains. The city of Columbus, Ohio, reduced smoke violations 91% in 7 years and today has a vastly cleaner atmosphere. Incinerators and autos plus dumps, etc. are greater sources of pollution than railroads. *Subject Headings:* **1. Atmospheric pollution control 2. Railroad smoke reduction 3. Smoke.**—*M.R.*

8.4–151 551.510.42

Grano, Charles X. (*Southern For. Exp. Stat., Forest Serv., Crossett, Ark.*), **Dust spheres: a report on their occurrence in Southeast Arkansas.** *Monthly Weather Review*, Wash., D. C., 83(11):265–266, Nov. **1955.** 2 figs. **DWB, DLC**—Physical description, measurements and photographs of dust spheres caught 6 mi south of Crossett, Ark. The method of collection by means of pollen traps and the weather conditions on day of collection are described. Averages and extremes of dust particles are given. *Subject Headings:* **1. Dust spheres 2. Dust collecting techniques 3. Crossett, Ark.**—*I.L.D.*

8.4–152 551.510.42:551.590.25

Hodge, Paul W., **Opaque spherules in dust collected at isolated sites.** *Nature*, London, 178(4544):1251–1252, Dec. **1, 1956.** 4 refs. **DWB**—Daily collections of dust on adhesive slides at several remote places in N. America were examined for opaque shiny spherules of diameter 3–10μ, believed to be meteoric. The average fall was 1.1/cm^2/day, equal to 10^9 kgm/yr for entire earth. *Subject Heading:* **1. Meteoric dust.**—*C.E.P.B.*

8.4–153 551.510.42:628.53(05)

Marsh, Arnold, **The story of "Smokeless Air."** *Smokeless Air*, 27(100):87–89, Winter **1956.** fig. **DWB**—The first issue appeared in autumn 1929 under the title "Clean Air" (cover reproduced). Later it became the "Journal of the Smoke Abatement Society" and in 1939 "Smokeless Air." During the war years only 3 issues a year were published. *Subject Headings:* **1. Smoke Abatement Society 2. Smokeless air 3. Periodicals.**—*C.E.P.B.*

8.4–154 551.510.42:551.588.7

Moses, Harry (*Radiological Phys. Div., Argonne Natl. Lab.*), **Air flow patterns near buildings: a motion picture study.** *Air Pollution Control Association, 48th, Detroit, Mich., May 1955, Proceedings*, pub. [**1955**]. Section 7. 5 p. **DLC**—Moving picture of smoke plumes from elevated sources (ignited grenades at balloon level of 150 ft above top of buildings) at Argonne Natl. Lab., show flow patterns around the buildings. These are studied in connection with meteorological observations made 1 mile away at Argonne Tower Meteorological Station (145 ft high). Plume is wary and oscillates, varying in direction by as much as 180°. During stable (night) conditions fluctuations are least, and are greatest when heating at surface is great! Lee "cartwheel" is often noted—due to pressure deficit in lee of building. Concentration increases in this sea. Plumes 75 ft above building were influenced by building. *Subject Headings:* **1. Smoke plume behavior 2. Building effects on smoke plumes 3. Argonne National Laboratory, Lemont, Ill.**—*M.R.*

8.4–155 551.510.42:628.53:92

The new President, R. Lessing, Ph.D., F.R.I.C., F.Inst.F., M.I.Chem.E. *Smokeless Air*, 27(100):90–91, Winter **1956.** photo. **DWB**—Dr. LESSING joined the Coal Smoke Abatement Society in 1908 and has been actively engaged in Smoke Abatement activities ever since. A consultant chemist and chemical engineer, he brings expert knowledge to problems of air pollution. *Subject Headings:* **1. Smoke Abatement Society 2. Biography 3. Lessing, R.**—*C.E.P.B.*

8.4–156 551.510.42:551.593.5

Peterson, Axel H. (*Mellon Inst., Pittsburgh, Pa.*), **Measurement of the visibility aspect of air pollution by means of light scattering.** *Air Pollution Control Association, 48th, Detroit, Mich., May 1955, Proceedings*, pub. [**1955**]. Section 11. 8 p. 4 figs., 4 refs. **DLC**—Scattering of sunlight by smoke particles reduces visibility in the daytime far more than the actual particles impede visibility in shade or at night. Haze is redefined as "sunlight reflected from smoke in the air, which impedes vision." A light scattering instrument for air pollution studies making use of the right angle rather than forward angle viewing (more like actual visual conditions) and reduction of stray light to 1/3,000 that of a forward scattering instrument. One cigarette smoked in an auditorium (118,000 cu ft) increased scattering by four. Enough scattering could be caused by 50,000 people smoking 2 cigarettes in morning to reduce the visibility in a downtown area appreciably. *Subject Headings:* **1. Scattering by smoke 2. Atmospheric pollution 3. Haze 4. Cigarette smoke pollution.**—*M.R.*

8.4–157 551.510.42:34:061.2

Powell, J. Enoch, **The Clean Air Act.** *Smokeless Air*, 27(100):92–97, Winter 1956. Also **The Southport Conference: reports and comments by two Delegates.** *Ibid.*, p. 100–103. photo. Also Kennedy, W. B. and Dickie, W. J., **The Clean Air Act and industry.** *Ibid.*, p. 112–117. **DWB**—The first paper is the text of the address by E. Powell, M.P. at the Southport Conference. He summarized the history since the BEAVER Committee and Government intentions for putting the Act into practice, including the appointment of a Clean Air Council. Some omissions from the Act are mentioned as needing research and future action. The second paper by "A Local Authority Contributor" and "A back-room boy" describes the proceedings at the Conference. W. B. Kennedy describes measures for smoke abatement undertaken since 1847 by the Manchester Corporation and the new duties placed by the Clean Air Act on Local Authorities. W. J. Dickie describes possible action by factory managements and the importance of instrumentation in boiler houses. *Subject Headings:* **1. Smoke abatement laws 2. Smoke Abatement Society 3. Conferences.**—*C.E.P.B.*

UPPER ATMOSPHERE—IONOSPHERE

See also: **Satellites—importance in upper atmos. research** (Vassy), 8.4–58; **Model for numerical forecasting including tropopause effects** (Knighting), 8.4–131; **Non-geostrophic extension of Sawyer-Bushby model . . .** (Knighting), 8.4–132; **UV absorption in oxygen atmos.** (Moriuchi), 8.4–207; **Height variation of upper atmos. winds** (Greenhow, Neufeld), 8.4–245; **Aerology of Arctic stratos.** (Warnecke), 8.4–315; **Ionospheric conditions in S. auroral zone** (Shapley), 8.4–336; **Whistlers** (Storey), 8.4–339; **Limiting polarization of high-frequency radio waves** (Landmark), 8.4–341; **Group velocity in magneto-ionic Theory** (Mullaly), 8.4–342.

8.4–158 551.510.535(45)

*Dominici, Piero, **Valori mediani mensili delle caratteristiche ionosferiche a Roma nel periodo Marzo 1949–Aprile 1953.** [Monthly mean values of characteristic ionosphere at Rome, March 1949–April 1953.] *Annali di Geofisica*, Rome, 8(4):379–400, Oct. **1955.** mostly tables. **DWB, DLC**—A table is presented for each month from March 1949–April 1953, giving hourly data (where available) for f_0F2, $h'F2$, f_0F1, $k'F_1$ f_0E, $h'E$ and percent of Es, etc. (critical frequency and height of F2, F1 and E layers and sporadic E data), and number of observations of each. *Subject Headings:* **1. Ionospheric data 2. Rome, Italy.**—*M.R.*

8.4–159 550.38:621.47:551.510.535

Forbush, Scott E. (*Carnegie Inst. of Washington*), **Variations in strength of wind system, in the dynamo mechanism for the magnetic diurnal variation, deduced from solar-flare effects at Huancayo, Peru.** *Journal of Geophysical Research*, Wash., D. C., 61(1):93–105, March **1956.** 8 figs., 3 tables, 5 refs. **DLC** Hourly means of solar-flare effects, or crochets, in magnetic horizontal intensity (H) at Huancayo exhibit, during daylight, a diurnal variation like that in H. This variation is expected, since McNish showed that flares produce magnetic effects indistinguishable from those which would result from an increase in strength of the current system responsible for the normal magnetic diurnal variation, S_q. On the other hand, it is found that the average crochet size in H is greater by a statistically significant amount for groups of days with greater S_q amplitude. For example, the average crochet size is 80 per cent larger for a group of 49 days with average $\delta W_2 = 25.2$ (Bartels' measure of amplitude of S_q) than for a group of 48 days with average $\delta W_2 = 1.6$. Although δW_2 increases with sunspot number, the crochet size does not. Thus, the larger average size of crochets, at Huancayo, on days when S_q is larger, indicates that the strength of the wind system is, on the average, greater on days with larger S_q. From the change in crochet size, the strength of the wind system must vary by 50 per cent at least. *Subject Headings:* **1. Diurnal magnetic variations 2. Solar flare effects 3. Dynamo theory of ionosphere 4. Huancayo, Peru.**—*Author's abstract.*

8.4–160 551.510.535:621.396.8:551.465

Hoffman, William C., **A theoretical model for high-frequency backscatter from the sea surface via the ionosphere.** *Journal of Atmospheric and Terrestrial Physics*, London, 7(4/5):

278–284, Oct. **1955.** 2 figs., table, 12 refs., 14 eqs. **DWB**—The sizable backscatter from the ocean for high-frequency radio waves propagated via the ionosphere is accounted for, using an essentially realistic model of the sea surface. The sea surface is in fact random; however, a good working approximation (at least in the case of high-frequency radio waves) is a perfectly-conducting doubly-trochoidal or doubly-sinusoidal surface. The average far-zone backscattered power is computed for each type of surface on the basis of the "current distribution" method and Breit-Tuve theorem. The assignment of realistic values to the ocean parameters then yields values of the backscattered power which are of the same order of magnitude as those observed. *Subject Headings:* **1. Radio wave-scattering 2. Sea disturbance.**—*Author's abstract.*

8.4–161 551.510.535:538

Lehnert, B. (*Royal Inst. of Tech., Stockholm*), **Magneto-hydrodynamic waves in the ionosphere and their application to giant pulsations.** *Tellus*, Stockholm, 8(2):241–251, May **1956.** 2 tables, 30 refs., 75 eqs. Also: Comments by S. B. Pickelner and B. Lehnert. *Ibid.*, 9(1):138–139, Feb. **1957. DLC**—In magneto-hydrodynamics conservation of energy leads to the adiabatic relation $du = pdg/g^2$, between the internal energy u per unit mass, the pressure p, and density g. The relation is valid for arbitrary amplitudes in a non-dissipative medium. The Hall current modifies the properties of magneto-hydrodynamic waves in an ionized gas. The compressive modes and the Alfvén mode earlier discussed by VAN DE HULST are shown to be coupled by means of the Hall current. The dissipation of slightly damped waves is expressed in terms of the effective conductivity $\sigma_3 = \sigma_1 + \sigma_2 2/\sigma_1$ earlier introduced by COWLING. The theory is applied to magneto-hydrodynamic oscillations in the layers of the ionosphere. The possible periods of the waves are consistent with the periods of "giant pulsations" which have been observed as a type of perturbation in the earth's magnetic field in the auroral zone. The results indicate that magneto-hydrodynamic waves in the E-, F-, and F_2-layers may explain the existence of giant pulsations as well as the occurrence of rapid vibrations in the terrestrial magnetic field. *Subject Headings:* **1. Magneto-hydrodynamic waves 2. Ionospheric waves.**—*Author's abstract.*

8.4–162 523.746:551.510.535:551.594.7

Minnis, C. M., **A new index of solar activity based on ionospheric measurements.** *Journal of Atmospheric and Terrestrial Physics*, London, 7(6):310–321, Dec. **1955.** 4 figs., 3 tables, 3 refs., 20 eqs. **DWB**—Ionospheric forecasts depend on solar activity. Sunspot number has some defects. A new index I_{F2} has been constructed for 1938–54, computed from the mean critical frequencies in the F2 layer at Slough, Huancayo and Watheroo, calibrated in terms of sunspot relative number, and with an error only about 1/10 that of the latter. *Subject Headings:* **1. Solar activity 2. Ionospheric critical frequency.**—*C.E.P.B.*

8.4–163 551.510.535

Parkinson, R. W., **The night-time lower ionosphere as deduced from a theoretical and experimental investigation of coupling phenomena at 150 kc/sec.** *Journal of Atmospheric and Terrestrial Physics*, London, 7(4/5):203–234, Oct. **1955.** 28 figs., table, 27 refs., 3 eqs. **DWB**—Final results of an experimental programme for the investigation of coupling phenomena at 150 kc/sec, which covered a period of some ten months in all, are presented. Conclusions are obtained, from a comparison of the theoretical results presented in the preceding paper and the experimental data, regarding the shape of the night-time D-layer in the coupling region and its seasonal and diurnal variations. Sunset D-E region models for July and Nov. 1953 are proposed. A theoretical recombination coefficient model suggested by MITRA (1954a) is then applied in the usual manner to determine the variation of these models with time of night. Finally, comparison is made both with the conclusions obtained from the data on coupling phenomena and with all other available low-frequency data; very good agreement is obtained in all cases. It is concluded that the theoretical analysis satisfactorily explains the experimental observations. *Subject Heading:* **1. Ionosphere theory.**—*Author's abstract.*

8.4–164 551.510.535:621.396.11

Pineo, V. C. (*Nat. Bureau of Standards, Wash., D. C.*), **Oblique-incidence measurements of the heights at which ionospheric scattering of VHF radio waves occurs.** *Journal of Geo-*

physical Research, Wash., D. C., 61(2, Pt. 1):165–169, June **1956.** 3 figs., 2 refs., eq. **DLC**—Indirect measurements of the heights at which ionospheric scattering of VHF waves occurs, using the technique of measuring the differences in the times of arrival of tropospheric and ionospheric pulses received over an 810-km oblique-incidence path, were made by the National Bureau of Standards in Nov. 1952 and in Jan. 1953. These measurements show approximate heights of 86 km and 70 km, respectively, for the night-time hours and the midday hours. The accuracy of the heights obtained in this way are subject to uncertainties about the actual tropospheric delays. *Subject Headings:* **1. Ionospheric scattering 2. Ultrashort wave propagation.**—*Author's abstract.*

8.4–165 551.510.535:523.746

Reber, Grote (*G.P.O., Hobart, Tasmania, Australia*), **World-wide spread F.** *Journal of Geophysical Research*, Wash., D. C., 61(2, Pt. 1):157–164, June **1956.** 7 figs., 4 refs. **DLC**—Data over the ascending and descending parts of the recent sunspot-cycle from widely distributed ionosphere stations have been utilized to trace the geographic features and nature of the spread-F equator in low latitudes. Indications are that the spread-F equator is nearly a great circle, approximately parallel to the geomagnetic equator, but swinging, during an 11-year period, through an angle of plus and minus 25° of latitude, about an axis through Japan and Argentina. The two fundamental types of spread F (polar and equatorial) and forked F are discussed. *Subject Headings:* **1. F layer equator 2. Sunspot effects on ionosphere.** —*Author's abstract.*

MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE

See: **Hydrodynamics applied to dynamic met.** (Bjerknes), 8.4–13; **Man's influence on weather** (Mason), 8.4–140; **Energy releasing processes . . . in a rotating field** (Kuo), 8.4–181; **Meridional circulation** (Kuo), 8.4–182; **Stability of baroclinic flow** (Pocinki), 8.4–185; **Cyclone development** (Means), 8.4–193; **Atmos. stability and surface pressure changes** (Vítek), 8.4–221.

8.4–166 551.511:551.542:551.524.2

Berkes, Zoltan, **Földfelszini átlagos hőszállítás az északi félgőmbőn.** [Average thermal advection at the surface over the Northern Hemisphere.] *Időjárás*, Budapest, 60(1):12–16, Jan./Feb. **1956.** 2 figs., 2 tables, 4 refs. Russian and French summaries p. 12. Text in German p. VIII–X. **DLC**—From sea-level pressure and temperature data for the Northern Hemisphere (1921–1930) in Jan. and July, charts of average thermal advection during those months are constructed, showing qualitative amounts of cold and warm advection discernible from the relative positions of isobars and isotherms. The annual advection chart is also presented, showing winter-type advection. The advection pattern is similar to the pattern found on the annual isanomaly chart for the same period. Among the salient features the author notes the cold advection from the cold center in northwestern Siberia to the North Polar region, and a distinct advective regime in Hungary (partly due to orography) involving both warm and cold advection. *Subject Headings:* **1. Advection of heat 2. Heat transport 3. Northern Hemisphere.**—*G.T.*

8.4–167 551.511:551.524:551.501.4

Dési, Frigyes, **A virtuális hőmérsékletről.** [On virtual temperature.] *Időjárás*, Budapest, 60(2):114–115, March/April **1956.** 7 eqs. **DLC**—The two most commonly used formulas for virtual temperature (T_v) are: $T_v = \frac{T}{1-0.377\epsilon/p}$ and $T_v = T(1+0.604s)$, where T = temperature (degrees absolute), s = specific humidity, p = pressure and ϵ = vapor pressure. This note suggests a simple mathematical procedure for deriving one of these formulas from the other, which has not been done before in world literature. *Subject Heading:* **1. Virtual temperature determination.**—*G.T.*

8.4–168 551.511

Gião, Antonio, **L'énergie des perturbations et les deux régimes du mouvement des fluides en météorologie synoptique.** [Energy of disturbances and the two systems of fluid motion in

synoptic meteorology.] *Geofisica Pura e Applicata*, Milan, 32:107–123, Sept./Dec. **1955.** 2 figs., 3 refs., 56 eqs. English summary p. 108–109. **DWB, DLC**—The thermo and hydrodynamic equations are synthesized and applied to energy transformations in atmospheric disturbances by separating the motions into a basic motion and a perturbation to derive a simple but exact form of the equation. This equation expresses the perturbation of kinetic energy of motion around the center of gravity of the mass as a function of the perturbation of enthalpy and of energy dissipation inside the mass by frictional stresses. This last must contribute in some portions of the fluid to an increase in the kinetic energy of the disturbances. The time variation of enthalpy disturbances must vanish for any mass with no perturbation of the motion of its boundary surface and hence the time variation of perturbation of kinetic energy of motion around the center of gravity is due solely to change in rate of energy dissipation by friction. *Subject Headings:* **1. Thermodynamics of disturbances 2. Enthalpy.**—*M.R.*

8.4–169 551.511

Höiland, Einar, **A note on resonance instability.** *Norske Videnskaps-Akademie i Oslo. Institutt for Vaer- og Klimaforskning, Report*, No. 6, **1955.** 3 p. 2 figs., ref., 3 eqs. **DWB**—Stability waves (rigid upper and lower surfaces, etc.) and instability waves (3 fluids, 2 fluids with a rigid lower surface and sliding interface or free upper surface, etc.) are discussed and two models shown which illustrate the formation of resonance waves. *Subject Headings:* **1. Resonance instability of fluids 2. Instability waves.**—*M.R.*

8.4–170 551.511:551.513

†Houghton, D. M., **Heat sources and sinks at the earth's surface.** *Great Britain. Meteorological Research Committee, M.R.P.*, 1005, Sept. 26, **1956.** 13 p. 4 tables, 32 refs. Mimeo. **DWB**—The factors in the heat balance of the earth's surface are discussed from the point of view of variations which may affect the circulation of the atmosphere over a wide area. Heat storage in the oceans is first considered, and it is estimated that an anomaly of +1°C in sea temperature would supply about 50 cal/cm²/day to the air, rising to 1200 in strong convection. Freezing of the sea causes a loss of 380 cal by long-wave radiation. On the continents the factors are all highly variable; the *maximum* effects are (cal/cm²/day): conduction ±30, thawing ground in sun −150; thawing snow −40, albedo of snow −180, of dry ground −50, evaporation and evapotranspiration (change from moist ground to desert or vice versa) ±200. An excellent bibliography is appended. *Subject Heading:* **1. Heat sources and sinks.**—*C.E.P.B.*

8.4–171 551.511

†Jung, Glenn H., **Energy transport by air and sea.** (In: **Dynamic North.** Wash., D. C., Technical Assistant to Chief of Naval Operations for Polar Projects, 1956. Vol. 1, Pt. 14. 19 p. (loose-leaf) 7 figs., 5 tables, 47 refs., 2 eqs.) **DWB**—The quantitative aspects of the energy balance of the earth-sea-atmosphere system in the Northern Hemisphere are outlined and the chief contributions to this important problem cited. Tables and diagrams show the relative magnitudes of radiation quantities and transport by oceanic or atmospheric currents at different latitudes or seasons. The biggest part of the meridional transfer of heat occurs by means of latent heat transfer in the atmosphere (water vapor) whereas the sensible heat transfer in the ocean is less important, but still appreciable. Sensible heat transport in the atmosphere occurs mainly from 50°–55°N. *Subject Headings:* **1. Energy transport by sea and air 2. Northern Hemisphere.**—*M.R.*

8.4–172 551.511:551.551

Krastanov, L., **Vurkhu turbulentnite pulsatsii na niakoi meteorologichni elementi.** [On the turbulent pulsations of some meteorological elements.] *Bulgarska Akademiia na Naukite, Sofia, Izvestiia, Otdelenie za Fiziko-Matematicheski i Tekhnicheski Nauki, Seriia Fizicheska*, 5:135–147, Jan./Dec. **1955.** fig., 9 refs., 23 eqs. Russian and English summaries p. 146–147. Also his: **Novo sudrzhanie na kriteriia za turpulentnost v atmosferata.** [New contents of the criterion for turbulence in the atmosphere.] *Ibid.*, p. 149–159. 5 refs., 22 eqs. Russian and English summaries p. 156–159. **DLC**—The object of the first paper is to make use of the simplified concepts of the semiempirical turbulence theory for the purpose of de-

termining turbulent exchange by means of turbulent eddies. A fundamental concept is the mixing length, which is defined as the distance covered by the eddy in a vertical direction between the level of its origin and the level at which it mixes with the surrounding medium. The pulsation of a physical parameter (mass) at a given level is defined as being the difference between the momentary value of the mass brought in by the eddy at the given level and the mean value of the mass (assessed for a sufficient length of time), which has existed at the given level prior to the arrival of the eddy. It is on the basis of these prerequisites that the turbulent pulsations of temperature, potential temperature, density and pressure as well as the dependence existing between them are determined. The theoretical conclusions as to the order of the pressure pulsations fall well in agreement with the values experimentally determined by other authors. In the second paper it is shown that the difference between the local change in turbulent flow with height is equal to the characteristic value in Richardson's criterion. On this basis it is established that turbulent movements can originate or be maintained in the surface layer of the air with arbitrary small values of dissipation. *Subject Headings:* **1. Turbulent exchange 2. Turbulence theory 3. Mixing length 4. Turbulent flow.**—*From author's abstracts.*

8.4–173 517.512.2:551.511:525.6

Siebert, Manfred, **Analyse des Jahresganges der 1/*n* tägigen Variationen des Luftdruckes und der Temperatur.** [Analysis of the annual variation of the 1/*n* daily variation of atmospheric pressure and of temperature.] *Akademie der Wissenschaften zu Göttingen. Math.-Physik. klasse [Abt. IIa?], Nachrichten*, No. 6:127–144, **1956.** 6 figs., tables, 18 refs., 13 eqs. **DWB**—The paper sets out a method of harmonic analysis of atmospheric oscillations the frequency of which is an integral multiple of the solar or lunar day. As an example the temperature oscillations (1–¼ day) in 50–60°N are analyzed, and lead to conclusions about heat exchange which support the theoretical analysis of W. KERTZ, taking account of the land and water distribution. The annual variation of the coefficients agrees in phase with that expected from the change in austausch due to the annual and semi-annual variations of solar radiation, but the observed amplitude is larger. Finally, the variations are expressed as planetary atmospheric tides. *Subject Headings:* **1. Harmonic analysis 2. Austausch theory 3. Atmospheric tides.**—*C.E.P.B.*

8.4–174 551.511.13

Kuo, H.-L., **Forced and free axially-symmetric convection produced by differential heating in a rotating fluid.** *Journal of Meteorology*, 13(6):521–527, Dec. **1956.** fig., 9 refs., 44 eqs. **DWB**—When heat is applied to the outer portion and removed from the inner portion of a rotating fluid, a forced direct symmetric convection is set up. The intensity of this motion is directly proportional to the rate of heating and inversely proportional to the square of the rate of rotation. It therefore must be very weak when the rate of rotation is large. However, when the temperature gradient becomes higher than a certain upper limit, a more violent symmetric convection will occur. This violent convection may be considered as an amplifying free convection, or a forced convection under near-resonance conditions. The criterion for this upper transition is obtained in this article by a simple method and expressed in terms of a Richardson number which combines the effects of rotation, static stability, viscosity, conductivity, radial temperature contrast, and the relative vorticity of the mean zonal flow into a single parameter. A comparison between this criterion and FULTZ' experimental results suggests that the relative vorticity of the mean zonal current has a larger effect on this transition at lower rotation rates. *Subject Heading:* **1. Convection theory.**—*Author's abstract.*

8.4–175 551.511.6

Landers, Holbrook, **Vorticity distribution and advection in the lower and middle troposphere.** *Journal of Meteorology*, 13(6):511–520, Dec. **1956.** 11 figs., 3 tables, 14 ref. **DWB**—Distribution of vorticity and advection up to 25,000 ft in 30–50°N, 70–100°W were computed from unsmoothed winds on March 22–25, 1951, synoptic conditions anticyclonic—cyclonic—anticyclonic. Mean relative vorticity at six 12-hr intervals is tabulated; overall mean was 2.4×10^{-6}/sec increasing from 2.04 at 2000 ft to 3.06 at 25,000 ft, compared with 1.5×10^{-6}/sec for mean divergence. Mean absolute vorticity was 11.6×10^{-5}/sec. The

advection of absolute vorticity is computed as ratio of actual displacement to that due to component of mean wind in direction of actual wind. Computation methods are fully described; the observed-wind method is 4 times as accurate as the geostrophic method. "It is found that the truest advection, with regard to both direction and speed, took place in the layer where the mean divergence was smallest, in this case at about 8000 ft." *Subject Headings:* **1. Vorticity distribution 2. Advection.**—*C.E.P.B.*

GENERAL CIRCULATION

See also: **Dynamics of general circulation** (Fleagle), 8.4–20; **Steering of deep cyclones** (Klug), 8.4–23; **Meridional cross sections, Southern Hemisphere** (van Loon), 8.4–103; **Southern oscillation** (Schell), 8.4–137; **Heat sources and sinks** (Houghton), 8.4–170; **Energetics of large scale atmos. turbulence** (Saltzman), 8.4 224; **Atmos. circulation in upper troposphere and lower stratos., Sardinia** (Serra), 8.4–243; **Precip. and circulation, S. Africa** (Rubin), 8.4–271.

8.4–176 551.513:551.557.2

§Serra, Adalberto, **Circulação superior.** [Upper air circulation, Pt. 1.] *Revista Brasileira de Geografia*, Rio de Janeiro, 15(4):517–596, Oct./Dec. **1953.** [**Pt. 2**], *Ibid.*, 16(1):3–75, Jan./March **1954.** 263 figs. French, Spanish, English, German and Esperanto summaries, 16(1):74–75. **DWB, DLC.** Also issued in reprint form, with imprint Rio de Janeiro, Instituto Brasileiro de Geografia e Estatistica, Conselho Nacional de Geografia, **1954.** 126 p.—The first section is a theoretical and general discussion of the construction of stream lines, the hodograph calculation of thermal wind and the seasonal characteristics and secondary circulation as indicated by the 5000 m, 3000 m and 1500 m charts and isotherm charts; an analysis of circulation charts according to the method of SCHERHAG as applied to 5400 m charts, the method of PETTERSSEN to 1500 m, the 3000 m and 900 m charts, the structure of fronts and of troughs and thermodynamic analysis methods including the Rossby diagrams, pseudoadiabatic diagrams and the parcel and slice methods. Sec. II deals with thermodynamic forecasting of maximum temperature and of cloudiness for various specified stations in Brazil. Sec. III is an analysis of upper air variations of pressure and temperature, of the secondary circulation and of the circulation mechanism over selected points. Sec. IV is an account of secondary circulation by seasons for various stations. *Subject Headings:* **1. Atmospheric circulation 2. Upper air circulation 3. Upper air analysis.**—*I.L.D.*

8.4–177 551.513.1:551.541:551.558.21

Queney, Paul, **Initial value problems in a double couette-flow.** California. Univ. at L. A. Dept. of Meteorology, Contract AF 19(604)-728, Scientific Report, No. 1, Jan. **1954.** 117 p. 40 figs., numerous eqs. Reproduction of ms. **MH-BH**—Extensive, theoretical treatment of problem of perturbations induced in hydraulic flow at certain critical velocities. In Pt. I the basic definitions and formulas are set forth and illustrated (Fourier conjugates, Fourier transforms, Parseval's theorem, Intensity theorem, Exponential Integral, Fresnel integrals, combined Fresnel integrals). Pt. II, Perturbation association with a local deformation of the interface in an unbounded double couette flow. Pt. III, Perturbation associated with a local vorticity—disturbance in an unbounded double couette flow. Resonance waves. Pt. IV, Perturbation association with a local deformation of the interface in a half-bounded double couette flow. Dispersion waves. Pt. V, Local vorticity disturbances or local deformations of interfaces. Pt. VI, Application to mountain wave problem. *Subject Headings:* **1. Lee wave theory 2. Double couette flow.**—*M.R.*

8.4–178 551.513.1:551.555.1

Riehl, H. and Malkus, Joanne S., **On the heat balance and maintenance of circulation in the trades.** *Royal Meteorological Society, Quarterly Journal*, 83(355):21–29, Jan. **1957.** 3 figs., 5 tables, 6 refs., 15 eqs. **DWB**—The heat balance in NE trade along trajectory 32°N 136°W to Hawaii is calculated from radiative cooling, flow of heat from ocean to atmosphere, and heat of condensation, assuming no heat gain. It is found that the trade gains energy along the trajectory; this gain must be exported as sensible (25%) and latent heat (75%)

to help maintain the general circulation in other parts of the globe; the trade is a driving branch of the general circulation. The heat transmitted from ocean to atmosphere is limited to the layer below 800 mb where it maintains vertical turbulence. *Subject Heading:* **1. Trade wind heat balance.**—*C.E.P.B.*

8.4–179 551.513.2:551.557(211.1)

Godson, Warren L., **Arctic jet streams and high-level turbulence.** (In: Russell, Pamela and Ballabon, Maurice B. (*eds.*), **Informal papers in Arctic meteorology.** McGill Univ. Arctic Meteorological Group, Contract AF 19(604)-1141, Scientific Report, No. 1, Dec. 15, **1955.** p. 14–20. figs., 4 refs., eqs.) **DWB**—The incidence of jet cores is studied in relation to the 500 mb temperature field, following McIntyre and Lee. The main high-latitude jet during winter is at about 32,000 ft, and lies on the average above the −22°C isotherm at 500 mb, corresponding loosely to the position of the mA front. Traces of a high-latitude jet occur near 55,000 ft, whose origin is attributed to the intense thermal gradient that develops in the ozone layer near the northern edge of illumination during periods of zonal flow. Since direct observations are lacking, the incidence of high-level turbulence in high latitudes can only be inferred from theory. A stability criterion is devised, whose application indicates that high-level turbulence should occur in the Arctic, but that the shears required for severe turbulence are too high for it to be a common occurrence near Arctic jet streams. *Subject Headings:* **1. Arctic jet stream 2. Jet stream turbulence.**—*Abstract's abstract.*

8.4–180 551.513.2

Krueger, Arthur F. (*U. S. W. B., Wash., D. C.*), **Weather and circulation of Dec. 1954: a month with a cyclonic polar vortex and fast westerlies in high latitudes.** *Monthly Weather Review*, Wash., D. C., 82(12):374–377, Dec. **1954.** 4 figs., 8 refs. **DWB**—Dec. was marked by abnormally strong westerlies at high latitudes but at 700 mb wind speeds were subnormal at middle latitudes. This situation was associated with an "elongated area of below normal 700 mb heights extending from the Gulf of Alaska across the Polar basin to Greenland, and then southeastward into Europe with the greatest negative anomaly (−440 ft) located in a closed cyclonic vortex over the Atlantic Arctic." Positive height anomalies, mostly centered north of 45°N lat., surrounded this area. A detailed description of the positive anomalies including their structure and associated air flow and an account of the weather over the U. S. and of the abnormally intense polar vortex which characterized 1954 are presented. *Subject Headings:* **1. Waves in the westerlies 2. Polar vortexes 3. Atmospheric circulation anomalies 4. North America.**—*I.L.D.*

8.4–181 551.513.2:551.511

Kuo, Hsiao-Lan, **Energy releasing processes and stability of thermally driven motions in a rotating fluid.** Massachusetts Institute of Technology. Dept. of Meteorology, Contract AF 19(604)-1000, General Circulation Project, Scientific Report, No. 1, Dec. 31, **1954.** 59 p. 5 figs., 16 refs., 86 eqs. **DWB**—The hydrodynamic and thermodynamic equations of motion, etc. are solved to take into account the physical processes (such as differential heating and rotation) affecting the general circulation of the atmosphere as represented by a rotating fluid. The energy releasing processes are treated in Ch. 3, the equations governing the stability criterion in Ch. 4; solutions by double Fourier series in Ch. 5; analytic solutions for a semi-nonviscous fluid in Ch. 6; transport of heat and zonal momentum, and the energy release in Ch. 7. Thermally driven disturbances are shown to produce a poleward and upward transport of heat and downward transport of zonal momentum in the zone of surface westerlies. The maximum upward heat transfer occurs at the level $z=d/2$ and has a cooling effect in the lower levels and a heating effect in the upper layers. *Subject Headings:* **1. General circulation 2. Heat and momentum transport 3. Rotating fluid experiments.**—*M.R.*

8.4–182 551.513.2:551.511.32

Kuo, H.-L., **Forced and free meridional circulations in the atmosphere.** *Journal of Meteorology*, 13(6):561–568, Dec. **1956.** 3 figs., table, 17 refs., 33 eqs. **DWB**—The meridional variation of the sum of the non-adiabatic heating and the eddy transfer of heat, and the vertical variation of the sum of the frictional dissipation and eddy transports of zonal

momentum, are shown to act as two forcing functions which produce mean meridional circulations in the atmosphere. The form and intensity of these circulations are greatly influenced by the mean temperature distribution. When the meridional temperature contrast is higher than a certain limit, these forced motions change into a more violent free convection. The criterion of this transition is obtained by a simple method and expressed in terms of a Richardson number.

$$\mathrm{Ri} \equiv g \frac{\partial \log \vartheta}{\partial z} \left(\frac{\partial u_0}{\partial z} \right)^{-2} \leq f^2 (f Z_0 + c^2)^{-1},$$

where Z_0 is the absolute vorticity of the mean zonal flow, and c is the coefficient of friction. This condition is generally not satisfied in the atmosphere, indicating that only weak, forced, mean meridional circulation can exist. The form and intensity of the meridional circulation produced by sources of heat and momentum, and that produced by the mean non-adiabatic heating in an atmosphere at relative rest, are discussed. It is found that only a very weak, single, direct cell can be produced by the average non-adiabatic heating, with maximum meridional velocities of only a few centimeters per second. On the other hand, the effects of the horizontal eddy transport and frictional dissipation of zonal momentum tend to produce a three-cell meridional circulation in the troposphere, with a reverse cell in middle latitudes and direct cells in low and high latitudes. In the stratosphere, the circulations produced by this factor in low and middle latitudes are in the opposite sense as those in the troposphere. *Subject Headings:* **1. Meridional circulation theory 2. Dynamics of the atmosphere.**—*Author's abstract.*

8.4–183 551.513.2:551.557:551.515.3

Lee, Jean T. and Galway, Joseph G. (*both, Severe Local Storms Forecast Center, Kansas City, Mo.*), **Preliminary report on the relationship between the jet at the 200-mb level and tornado occurrence.** *American Meteorological Society, Bulletin,* 37(7):327–332, Sept. **1956.** 9 figs., 7 refs. **DWB**—In a study of the 200-mb Height Chart and associated jet to determine their usefulness in tornado forecasting, a consistent phenomenon was observed, namely, that the majority of tornadoes investigated occurred along or near the −60°C isotherm at 200-mb. More precisely, the western and southern portions of the −60°C isotherm of the cold "pool" it circumscribed were the favored area. The jet at 200-mb in most cases delineated that portion of the −60°C isotherm under which tornadoes occurred. Further, certain consistencies appeared on the tropopause chart that might be related with tornado occurrence. *Subject Headings:* **1. Jet stream location 2. Tornado location.**—*Authors' abstract.*

8.4–184 551.513.2:551.557

Nojima, H., **The jet streams over Honjo and Tateno in the winter season 1951–1952.** *Tateno, Japan. Aerological Observatory, Journal,* 5(3):219–232, March **1954.** 9 figs., 3 tables, 12 refs. Also his: **The easterlies in the lower stratosphere observed over Honjo and Tateno in January and February 1952.** *Ibid.*, p. 233–244. 7 figs., 10 refs. In Japanese; English summaries p. 219 and 233. **DLC**—(1) Analyses based on the meridional cross sections are made for a few cases in which strong winds were observed in the layer of maximum wind at the height of 12–13 km in the period of the relay observation at Honjo and Tateno, Jan. 16–March 9, 1952. (2) Easterlies were observed a few times just above the height of 20 km during the relay observations. Their appearance is described and the accuracy of observation discussed. An interim investigation is made regarding available data on easterlies in the lower stratosphere in the winter season over middle latitudes. *Subject Headings:* **1. Jet stream 2. Winter jet stream 3. Easterly jet stream 4. Honjo, Japan 5. Tateno, Japan.**—*Author's abstracts.*

8.4–185 551.513.2:551.511

†Pocinki, Leon S., **Stability of a simple baroclinic flow with horizontal shear.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers,* No. 38, July **1955.** 78 p. 19 figs., 33 refs., numerous eqs. **DLC**—The problem of stability of 3 types of flow: 1) barotropic, 2) baroclinic with no shear and 3) with shearing instability, is reviewed and an historical summary given for work from Helmholtz (1888) to Kuo (1953) and Thompson (1953).

The complete equations of equivalent baroclinic flow, an approx. equation for the perturbation stream function, the existence of neutral and of non-neutral solutions, are treated theoretically for small wave-like disturbances moving eastward, and the special cases of horizontal uniform baroclinic flow and barotropic flow are considered. A numerical example is given in section 7 and observational confirmation in section 8. It is concluded that instability of large scale motions depends mainly on the baroclinicity or the "conversion of potential energy of the mean flow into kinetic energy of the disturbances." *Subject Headings:* **1. Stability of baroclinic flow 2. Waves in the westerlies.**—*M.R.*

8.4–186 551.513.3:519.241.1

Berkes, Zoltán, **A hatàskőzpontok kapcsolata az általános légkőrzésben.** [Relation between centers of action in the general circulation.] *Időjárás*, Budapest, 60(2):82–87, March/April **1956.** 10 figs., 5 refs. Russian and French summaries p. 82. German version p. XIII–XVI. **DLC**—The transfer of masses of air between the principal centers of action is investigated by means of isocorrelation charts based on monthly values of Exner's atmospheric pressure anomalies for the 30-year period 1887–1916. The polar and the temperate regions are found to be the most important areas of compensation. Close correlations exist especially between the pressures of the Azores–Icelandic, and North Norwegian–Upper Italian regions. The cyclonic center of Genoa is also closely connected with the inner Siberian pressure. *Subject Headings:* **1. Centers of action 2. Correlation charts.**—*Trans. of author's abstract.*

8.4–187 551.513.3

Kunii, Koji, **Action center in relation to climate in the Hokuriku District.** *Journal of Meteorological Research*, Tokyo, 6(7):291–293, Sept. **1954.** 5 tables, 4 refs. In Japanese. **DWB**—The climate of the Hokuriku District is governed by the centers of action in the continent of Asia and the North Pacific. Taking the monthly mean atmospheric pressures, P_1, P_2, P_3 at Port Arthur, Honolulu, and Nemuro as indicators of Siberian High or Low, North Pacific High and Aleutian Low, respectively, the author found that the temperatures in the Hokuriku T have a large positive correlation with P_3 and a large negative one with P_1 from Jan.–June, a large positive correlation with P_2 from July–Aug., and a large positive correlation with P_3 and large negative correlation with P_2 from Nov.–Dec. *Subject Headings:* **1. Centers of action 2. Climate of Hokuriku 3. Hokuriku, Japan.**—*H. Arakawa.*

ATMOSPHERIC DISTURBANCES

See also: **Dynamics of general circulation** (Fleagle), 8.4–20; **Tropical met., practical aspect** (Palmer, et al.), 8.4–14; **Radar weather studies, May 27–June 8, 1954** (Stout, Hiser), 8.4–89; **Aerobee-hi report** (Pressly et al.), 8.4–107; **Squall line forecasting** (Baird), 8.4–135; **Jet stream-tornado relationships** (Lee), 8.4–183.

8.4–188 551.515

Kubota, S. and Iida, M. (*Met. Res. Inst., Japan*), **Statistical characteristics of the atmospheric disturbances.** *Papers in Meteorology and Geophysics*, Tokyo, 5(1):22–34, April **1954.** 7 figs., 2 tables, 7 refs., 3 eqs. **DWB**—The periods of the atmospheric phenomena are supposed to differ from each other according to their scales, e.g., there may be a positive correlation between the magnitude of scales and length of periods in the atmosphere. The purpose of this paper is to investigate the statistical characteristics of the atmospheric disturbances of various scales and further to find out the mechanism of mutual transfer of vorticity and kinetic energy of mean flow and disturbances. If we succeed in this attempt, the results obtained from it are expected to be useful also for such a forecasting problem as numerical prediction. In the present study the following characteristics of the atmospheric phenomena are dealt with, (1) the so-called "width of perturbations," (2) the stationarity of variations, (3) the spectral distribution of pressure and (4) the kinetic energy spectra, employing the 36 term harmonic coefficients calculated from the values of 500 mb level along 50°N, 45°N and 30°N latitude circles in the Historical Weather Maps. The periods subjected to analysis are Jan. (1946, 1949), May, June and July (1951). The results obtained are as follows. First the component waves of disturbances can be classified into three (or four) parts. Then let

n and $F(n)$ denote wave number and spectral function respectively. The motion of waves of small wave number is non-isotropic, oscillatory and moreover $F(n) = \text{const}$. Meanwhile the motion of waves of great wave number is isotropic, progressive and $F(n) \propto n^{-7/3}$ as expected. Further it may be concluded that the mean flow and the component waves of $n = 1, 2$ belong to the former and component waves of $n \geqq 6$ belong to the latter region. Accordingly the components of $n = 3, 4, 5$ are considered to constitute the region of middle wave number in our case. Next, the energy spectra indicate three sources of kinetic energy in the atmosphere, i.e., mean flow, component wave of $n = 3$ and of $n = 6$ or 7. *Subject Headings:* **1. Atmospheric disturbances 2. Kinetic energy spectrum in the atmosphere 3. Vorticity.**—*Authors' abstract.*

8.4–189 551.515:656.61

Rix, Robert, **Wetternavigation mit einem 10 Knoten-Schiff.** [Weather navigation with a 10-knot ship.] *Wetterlotse*, No. 108:217–220, Nov. **1956.** Editorial comment p. 221, 1 fig **DLC**—The "Transmichigan" left Hamburg for the Great Lakes on Oct. 9, 1956 and on advice from Hamburg Marine Office went by Pentland Firth and Belle Isle Strait. Navigation during the voyage was by weather broadcasts but no warning was received of a storm on Oct. 19 when wind reached S by W force 11, dropping suddenly to W 4. The difficulties of weather navigation in a slow ship are discussed. Commenting, RODEWALD points out that the sudden change of wind was due to the passage of a front. *Subject Heading:* **1. Weather in ship navigation.**—*C.E.P.B.*

8.4–190 551.515.1:550.342

Gutenberg, B. and Benioff, H., **An investigation of microseisms.** California Institute of Technology, Contract AF 19(122)-436, Final Report, Feb. 29, **1956.** 39 p. 10 figs. (incl. photos), 4 tables, 16 refs., 4 eqs.—Although microseisms recorded at coast stations are useful in forecasting tropical cyclones approaching from the sea, studies made in southern California in 1951–55, indicate that it is only during certain types of storms that coastal or inland stations could make use of microseisms to predict extratropical cyclones at sea. In most cases an analysis of the records from vectorial recorders and associated equipment in network (described and illustrated in detail) indicated that the 5–10 second microseisms come from the SW quadrant and that the motions are of the Rayleigh wave type. Mountain ranges were found to be effective barriers. Usually the heaviest microseisms occur 1 or 2 days after the storm center passes inland, or as the heaviest ocean swell beats against some part of the California Coast. *Subject Headings:* **1. Microseism networks 2. Microseisms from extratropical storms 3. Vectorial recorders.**—*M.R.*

8.4–191 551.515.1(94)

Maher, J. V. (*Central Met. Bureau, Melbourne*), **Development of secondary cyclones in the area from the Eastern Bight to Tasmania.** *Australian Meteorological Magazine*, Melbourne, No. 9:14–31, June **1955.** 8 figs., 4 tables, 8 refs. **DWB**—A study is made of the formation of secondary cyclones in a restricted part of the Australian area from the Eastern Bight to Tasmania, with especial reference to the application of SUTCLIFFE's development theory. It has been found that by the use of this theory it is possible to obtain reasonably reliable indications of secondary development prior to the event, and even more reliable negative indications. *Subject Headings:* **1. Cyclone development 2. Sutcliffe's development theory 3. Australia.**—*Author's abstract.*

8.4–192 532.594:551.515.1

Szymborski, Stanislaw (*Polish Academy of Science*), **The phenomenon of seiche in the Gulf of Gdansk on the 17th January, 1955.** *Acta Geophysica Polonica*, Warsaw, 4(1):33–42, **1956.** 6 figs., table, 6 refs. Polish summary p. 42. **DWB, DLC**—This is an analysis of oscillations of the sea surface in the Gdansk Gulf as produced by the passage of a barometric depression on Jan. 17, 1955 and recorded by the mareograph of the Oceanographical Station at Sopot. The original diagram of the mareograph, complemented with records for several days before the storm, and of a short post-storm period, are presented. The discussion of the Jan. 17, 1955 phenomenon is preceded by a brief description of earlier investigations of similar phenomena. The analysis of the last storm recording confirms conclusions made

earlier that variations of the shortest period appear most conspicuously after the passage of barometric depressions in the region of a cold front or of an occluded front advancing closely upon the mass of warm air. *Subject Headings:* **1. Seiches 2. Barometric depressions 3. Gulf of Gdansk, Poland.**—*A.M.P.*

8.4–193 551.515.11:551.511

§Means, Lynn L., **An investigation of cyclone development, storm No. 4.** Chicago. University. Dept. of Meteorology, Contract AF 19(604)-390, Technical Report, No. 8, Oct. **1954.** 37 p. 6 figs., 3 tables, 5 refs., eqs. **DWB**—The development of a storm which occurred in the U. S. during the period Dec. 13–15, 1951 is investigated. An attempt is made to ascertain to what extent this development could be accounted for by the terms in the vorticity equation which derive from the vorticity advection and the thermal advection. It is found that the computed patterns agree well with those observed, although the numerical values are considerably exaggerated. Computed values of vertical velocity and divergence are compared with the observed patterns of clear sky and precipitation and, on the whole, good agreement is found. The use of vorticity charts and thermal advection charts in routine forecasting is discussed briefly. *Subject Headings:* **1. Cyclone analysis 2. Vorticity computations.**—*Author's abstract.*

8.4–194 551.515.11:551.43

§Newton, C. W., **Mechanisms of circulation change during a lee cyclogenesis.** *Journal of Meteorology*, 13(6):528–539, Dec. **1956.** 24 figs., 3 tables, 17 refs., 3 eqs. **DWB**—The life cycle of a destructive cyclone over the United States during Nov. 16 to 21 1948 is investigated. The vorticity advection at 300 millibars, as an indicator of divergence in the upper troposphere, is shown to be closely related to the organization, maintenance and final collapse of the surface cyclone. The early period of most rapid cyclogenesis is investigated with reference to orographic factors. It is found that the cyclogenesis took place when the region of strongest upward motion at 500 mb, directly beneath the upper-tropospheric jet stream, became superimposed over the band of maximum descending motion at the earth's surface, giving maximum vertical stretching in the lower troposphere. Computations of the contributions of horizontal convergence, and of lateral differences of friction, to circulation changes indicate that, during the period of most rapid development, the latter was of about equal importance with the former in increasing the circulation. The mechanism of circulation production by friction, and orographic influences on the path taken by the cyclone, are discussed qualitatively. *Subject Headings:* **1. Cyclogenesis 2. Orographic effects.**—*Author's abstract.*

8.4–195 551.515.12:551.509.31

§Font Tullot, Inocencio, **Efectos de las depresiones frias en el tiempo de las Isles Canarias.** [Effects of cold depressions on the weather of the Canary Islands.] *Revista de Geofísica*, Madrid, 14(56):347–362, Oct./Dec. **1955.** 7 figs. English summary p. 347–348. **DWB, DLC**—Two distinct types of Northern Hemisphere circulation are recognized: 1) open wave type and 2) cellular (warm sub-polar anticyclones and cold lows in low latitudes). Several cases of cold cyclones in the Eastern Atlantic are cited and their history reviewed with surface and 500 mb charts for area (from U.S.W.B. and German Synoptic Charts), presented for March 1, 1951; Jan. 14, 1945; Nov. 8, 1950 and Dec. 19, 1953. These cold cyclones are most frequent from Nov.–March and they cause most of the rain and bad flying weather in the Canaries. Origin and movement, relation to jet stream and upper air circulation and to blocking highs or Mediterranean Lows are discussed. *Subject Headings:* **1. Synoptic case histories 2. Cold lows 3. Canary Islands.**—*M.R.*

8.4–196 551.515.13:551.576.3(262)

Dagnino, Ignazio (*Genoa Univ.*), **La frequenza dei centri di bassa pressione sul Mediterraneo centro-occidentale e la nebulosità sul Tirreno.** [Frequency of low-pressure centers over the central western Mediterranean and cloudiness over the Tyrrhenian.] *Geofisica e Meteorologia*, Genoa, 4(1/2):13–15, Jan./April **1956.** 2 figs., 5 refs. **DWB**—Frequencies of low-pressure centers over the Mediterranean and its coastal areas are analyzed from daily synoptic charts of the last decade. Mean variations of isonephs over the Tyrrhenian and

adjacent seas (1906 1939) are shown in a chart and commented on. *Subject Headings:* **1. Cyclone frequencies 2. Cloud variations 3. Mediterranean.**—*Trans. of author's abstract.*

8.4–197 551.515.3(766)

Asp, M. O. (*U. S. W. B., Little Rock, Ark.*), **Surface weather conditions relating to the occurrence of tornadoes in Oklahoma.** Paper presented at A.M.S., National Meeting, K.C. Mo., June 8–10, **1955.** 4 p. 3 figs., 2 tables. Mimeo. **DWB**—Relationships between tornado occurrence during each month and temperatures, dew points, pressure, sky conditions, weather and wind at time of a tornado within 10 miles or 40 miles of observing station are discussed and shown in graphs and tables for 121 tornadoes in Oklahoma. A brief list of empirical rules are extracted from data. Although the range of occurrences for each element is wide, it was found that a high positive correlation existed between tornado occurrence and temperature or dew point irrespective of whether or not the tornado was <10, 10–20, 20–30, 30–40, 40–50 or >50 miles away. *Subject Headings:* **1. Synoptic conditions for tornadoes 2. Objective tornado forecasting aids 3. Tornado data 4. Oklahoma.**—*M.R.*

8.4–198 551.515.3(44)

Delpech, L., **Sur une trombe à Chartres-de-Bretagne (I.-et-V.), le 22 mars 1955.** [A tornado at Chartres-de-Bretagne (Ille-et-Vilaine), March 22, 1955.] *La Météorologie*, Paris, Ser. 4, No. 40:317–323, Oct./Dec. **1955.** 7 figs., eqs. **DWB**—A tornado in central France is described with detailed explanation of the mechanics of damage done to buildings, trees and gravestones. The trajectory is shown in sketches with indication of the direction of action at various points. The attending synoptic situation is discussed. *Subject Headings:* **1. Tornadoes 2. France.**—*G.T.*

8.4–199 551.515.3

Hurst, G. W., **Waterspouts off the Straits of Gibraltar.** *Meteorological Magazine*, London, 85(1013):321–324, Nov. **1956.** 2 figs., 3 photos, 2 refs. **DWB**—At least 4 waterspouts in line up to 2 mi apart were seen 60 mi W of Gibraltar on Nov. 21, 1955, and photographed from the air. Two photos show complete spouts, the third shows the sea surface. The photos are of great interest, including a "shoulder" or hollow cone at the exit from the cloud. A well developed levanter was blowing; the air was moist and very unstable (chart and tephigram). *Subject Headings:* **1. Waterspouts 2. Gibraltar.**—*C.E.P.B.*

8.4–200 551.515.3

Phillips, Victor V.; Galway, Joseph G. and Hanson, Donald M., **Tornadoes of Blackwell, Oklahoma–Udall, Kansas, May 25, 1955.** *Monthly Weather Review*, Wash., D. C., 83(10):224, 238, Oct. **1955.** fig. **DWB**—The same personal observations reported to the authors by several eyewitnesses of the tornadoes and severe thunderstorms that occurred on May 25, 1955 are presented. The observations were made at Braman, Okla., Tonkawa, Okla., Blackwell, Okla., eight miles west of Arkansas City, Kans., Oxford, Kans., Udall, Kans. etc. *Subject Headings:* **1. Tornado observations 2. Tornadoes, Oklahoma–Kansas (May 1955) 3. Blackwell, Oklahoma 4. Udall, Kansas.**—*I.L.D.*

8.4–201 551.515.4:551.577.37(54)

Ananthakrishnan, R. and Rajagopolan, K. S. V., (*Regional Met. Centre, Nagpur*), **Two spells of rainfall of unusually high intensity at Nagpur in June 1954.** *Indian Journal of Meteorology and Geophysics*, Delhi, 7(2):153–156, April **1956.** 2 figs., 6 refs., 6 eqs. **DWB, DLC**—Automatic records of wind, rainfall, dry and wet temperatures, relative humidity and pressure, with the rainfall record magnified, show the remarkable conditions which obtained during two record-breaking thundershowers in Madhya Pradesh during the first 10-days of the monsoon (June 21–22 and 26–27, 1954). The first storm gave 3.94 in. and the second 3.61 in., but both occurring within an hour. Rates are calculated on the Fulks (1935) method to show the necessary vertical velocity (19 km/hr) to account for the observed maximum rate which was 6.4 in. per hour on June 22. *Subject Headings:* **1. Thunderstorm rainfall 2. Excessive rainfall 3. India.**—*M.R.*

8.4–202 629.135:551.515.4

Frank, S. R., **Damage to aircraft flying in thunderstorms.** *Trans World Airlines, K. C., Missouri, Meteorological Technical Bulletin*, No. 50-2, [1950]. 4 p. **DWB**—Several instances of lightning, turbulence and hail encountered in flight by commercial aircraft are related in detail, with notes on the damage in each case, to various parts or accessories to the planes. *Subject Headings:* **1. Aircraft damage 2. Thunderstorm effects on aircraft.**—*M.R.*

8.4–203 551.515.4(42)

Hicks, J. A., **Exceptionally severe thunderstorm.** *Meteorological Magazine*, London, 85(1006):122–123, April **1956.** fig. **DWB**—Cambridge, England, area, Nov. 5–6, 1955, with heavy hail doing great damage, associated with a fall of temperature, which was marked above 700 mb. Five tephigrams from 2 h on the 4th to 2 h on the 6th show this. Other damage occurred in different parts of S.E. England. *Subject Headings:* **1. Thunderstorms 2. England.**—*C.E.P.B.*

RADIATION AND TEMPERATURE

RADIATION

See also: **Radiation in architecture and town planning** (Pleijl), 8.4–24; **Radiation measurement errors** (Wegener), 8.4–80; **Mean wind and temperatures, Marshall Is.** (Korshover), 8.4–94; **Sunshine and cloudiness, Sweden, 1901–1930** (Lindholm), 8.4–95; **Photolysis of potassium ferrioxalate** (Parker, Hatchard), 8.4–108; **Radiation errors in radiosonde temp. measurement** (Schulze, Abild), 8.4–122; **Prevention of overheating** (Malysheva), 8.4–312; **Twilight brightness** (Słomka), 8.4–322.

8.4–204 551.521.11:519.24

Matzke, H. and Funk, H., **Über Iterationen von Tagen mit und ohne Sonnenschein.** [Sequences of days with and without sunshine.] *Wetter und Leben*, Vienna, 7(5/6):100–105, **1955.** 2 tables, 5 refs., eqs. **DLC, DWB.** Also: Essenwanger, O., **Über Iterationen von Tagen mit und ohne Sonnenschein.** [On sequences of days with and without sunshine.] *Meteorologische Rundschau*, 9(5/6):98–99, May–June **1956.** 6 refs. **MH-BH**—Using Greifswald statistics of sunshine duration, the authors demonstrate the application of probability to a sample with two qualitative and quantitative alternatives and show that the sequence of days with and without sunshine is random and does not indicate any persistence. The second article is also based on Greifswald data. It is found that persistence tendency increases with length of sequence and is probably real. This is contrary to the conclusion of Matze and Funk. *Subject Headings:* **1. Sunshine sequences 2. Statistical analysis 3. Greifswald, Germany.**—*I.L.D., C.E.P.B.*

8.4–205 551.521.12:551.576.3:523.6

Link, F., **Variations de climat et de l'activité solaire dans le passé.** [Variations of climate and of solar activity in the past.] *La Météorologie*, Paris, Ser. 4, No. 39:257–273, July/Sept. **1955.** 14 figs., tables, 14 refs. English and Spanish summaries p. 257. **DWB**—The frequency of comet discoveries since 2300 B.C. can be used as an index of cloudiness at night. It shows a secular variation with a period of 4 centuries. Auroral frequency shows a similar variation. The reason would seem to be a secular variation of solar activity having a period of 400 years. *Subject Headings:* **1. Solar radiation variations 2. Cloud variations 3. Comet observations.**—*Author's abstract.*

8.4–206 551.521.3

*Curcio, J. A. and Knestrick, G. L., **Atlas of the absorption of the atmosphere from 5400 to 8520A.** *U. S. Naval Research Laboratory, NRL Report*, No. 4601, Aug. 23, **1955.** 18 p. 7 refs., mostly graphs. **DWB**—Several microphotometer traces of the atmospheric absorption spectrum in the spectral region of 5400 to 8520A, have been reproduced in atlas form. Two previously unreported water-vapor bands were found at about 5050A and 5400 to 5470A. It was found that many of the weaker water-vapor lines were apparently coincident with

unidentified lines in the solar spectrum. *Subject Headings:* **1. Atmospheric absorption bands 2. Infrared absorption.**—*Authors' abstract.*

8.4–207 551.521.3:551.510.534

Horiuchi, G. (*Aerological Obs., Tateno*), **Ultra-violet absorption in the oxygen atmosphere.** *Geophysical Magazine*, Tokyo, 27(2):293–299, March **1956.** 2 figs., 30 refs., 12 eqs. **DWB, DLC**—The equilibrium concentration of O_3 and O particles is recalculated by means of photochemical theory from several parameters recently published. A little larger concentration than ever is found for the upper mesosphere. Then the energy of ultra-violet absorption in the oxygen atmosphere is estimated. It is concluded that the secondary maximum of possible heating occurs at about the 65 km level and is mainly due to O_3 absorption. *Subject Headings:* **1. Ozone absorption 2. Ultraviolet absorption.**—*From author's abstract.*

8.4–208 551.521.3:551.521.61

Williams, Dudley, **Scattering and absorption of infrared radiation in the atmosphere.** Ohio. State Univ. Research Foundation, Contract AF 19(604)-516, Final Report, May 31, **1955.** 9 p.—This report summarizes the results obtained in theoretical and experimental studies of attenuation of infrared radiation by scattering and absorption. Resumés of the scientific reports already issued are presented in the present report along with a discussion of various studies that were not carried to definitive conclusions. The work described includes theoretical studies of absorption and scattering of infrared radiation and experimental infrared studies of scattering by particles of known size, scattering and reflection by clouds, and absorption by atmospheric gases under controlled laboratory conditions. *Subject Headings:* **1. Infrared scattering 2. Infrared absorption 3. Atmospheric scattering 4. Atmospheric absorption.**—*Author's abstract.*

TEMPERATURE

See also: **High altitude radiosonde flights** (Lowenthal, Arnold), 8.4-25; **Freezing of mulberry tree twigs** (Aoki), 8.4–69; **Winds and temperatures, Marshall Is.** (Korshover), 8.4–94; **Temp. effects on radiosonde pressure** (Pauly), 8.4–120; **Night cooling . . .** (Ashmore, Richardson), 8.4–138; **Thermal advection at the surface, N. Hemisphere** (Berkes), 8.4–166; **Virtual temp.** (Dési), 8.4–167; **Temp. and turbulence near the ground** (Shiotani), 8.4–225.

8.4–209 551.524:546.26.3:616.1

Korenevskaia, E. I. (*Moscow Med. Inst.*), **K voprosu o vliianii vysokoĭ temperatury vozdukha na toksicheskoe deĭstvie okisi ugleroda.** [Influence of high air temperature on the toxic action of carbon dioxide.] *Gigiena i Sanitariia*, Moscow, No. 9:19–24, Sept. **1955.** fig., 2 tables, 8 refs. **DLC**—Remarks on the effect of high air temperature upon the accumulation and desiccation of carboxyhemoglobin in blood under the actions of small amounts of CO_2 and the relationship between the accumulation of carboxyhemoglobin in blood and the appearance of autointoxication symptoms in human beings are followed by a report on experimental studies of the combined action of high air temperature (30°–45°C) and CO_2 in concentrations of 0.1 to 0.2 and 0.4 mg/litre upon rabbits. At an air temperature range of 40–45°C with a disturbance in heat regulating mechanism the intoxication with CO_2 occurs rapidly. The concentration of carboxyhemoglobin lags behind the clinical symptoms of autointoxication so that it cannot serve as an index of the latter. The resistance of the organism to high temperature decreases. *Subject Headings:* **1. High temperature effects on autointoxication 2. Carbon dioxide.**—*I.L.D.*

8.4–210 551.524(26)

van Loon, Harry, **Mean air-temperature over the southern oceans.** *South Africa. Weather Bureau, Notos*, 4(4):292–307, **1955.** 9 figs., 3 refs. **DWB, DLC**—Mean air temperature maps for the southern oceans for the four mid-season months are presented together with maps of annual range and temperature isoanomalies. The mean-temperature gradient in middle latitudes, which is representative of the temperature gradients in the troposphere in the same latitudes, changes little during the year. This leads to the conclusion that the

atmospheric circulation over the oceans in the belt of westerlies undergoes little change in intensity from one season to another. *Subject Headings:* **1. Temperature over oceans 2. Temperature gradient 3. Antarctic seas.**—*Author's abstract.*

8.4–211 551.524.31(52):551.584.31

Yoshino, Masatoshi (*Tokyo Univ. of Education*), **Reports on the air temperature at Nishiura, Izu (1). The comparison of the diurnal change of the air temperature in the small area.** *Journal of Agricultural Meteorology*, 7(3/4):91–94, Nov. **1952.** 3 figs., 10 refs. In Japanese; English summary p. 94. Also: Yoshino, M. and Fusuki, Koichi, **Air temperature at southern and northern valley sides (Comparison of the diurnal change of the air temperature in the small area, Pt. 3).** *Ibid.*, 8(1/2):33–36, March **1953.** 2 figs., 4 refs. In Japanese. English summary p. 36. **MH-BH**—Yoshino observed the diurnal change of the local air temperature distribution with 4 portable thermographs which were set at the ridge of the low spur slope of the mountain. Some results of March 4, 1951 are shown. He concludes that fluctuations reach about 0.3°C before sunrise, 0.4–0.5°C in the daytime, and about 0.2°C after sunset. The stronger the winds, the stronger the fluctuations become. The second report investigated the difference in the diurnal change of temperature between southern and northern valley sides in Otu-Chichitsu Mountain in the Sartama Prefecture. Portable thermographs were installed at 50 cm above the ground. The daily temperature variation on March 30 and 31, 1951 is presented by means of isopleths and analyzed statistically. (For Pt. 5, *see* 8.3–188, March 1957, *MAB.*) *Subject Headings:* **1. Diurnal temperature variations 2. Slope microclimatology 3. Nishiura, Japan 4. Sartama Prefecture, Japan.**—*From author's abstract, I.L.D.*

8.4–212 551.524.2:551.588.2(437)

Picko, Václav, **Závislost teploty ovzduši na nadmořské výšce.** [Dependence of air temperature on elevation.] *Meteorologické Zprávy*, Prague, 9(2):42–48, **1956.** fig., 8 tables, 16 refs. **DWB**—Monthly normal average temperatures are determined for 400 stations in Czechoslovakia, situated between 145 and 1606 m elevation (30-year period 1901–1930). Monthly values of typical temperature are tabulated for various height intervals. The temperature-height relation is found to follow a nonlinear function best represented by regression curves derived from L. H. C. Tippet's general curve. *Subject Headings:* **1. Temperature-height relationships 2. Topographical influences 3. Czechoslovakia.**—*G.T.*

8.4–213 551.524.2:551.588.2

Stružka, Vladmír, **Přispěvek ke studiu teplotních poměrü v hornatém území.** [Contribution to the study of thermal conditions in a mountain region.] *Meteorologické Zprávy*, Prague, 9(2):33–42, **1956.** 10 figs., 12 tables, 9 refs. Russian and German summaries p. 33. **DWB**—Two methods (the author's and the one developed by A. Gregor) for analyzing average temperature as a function of elevation are described in detail, with examples of average temperature computation from elevation and local temperature conditions. The methods are recommended for supplying missing temperature data for locations with no regular temperature measurement. It is shown that the assumption of a linear dependence of average temperature on elevation is fully adequate especially when the number of meteorological stations used is small as in the case of a small area. *Subject Headings:* **1. Temperature-height relationships 2. Topographical influences.**—*Trans. from author's abstract.*

8.4–214 551.524.33

Simojoki, Heikki, **Die Periodizität der Wintertemperatur in Stockholm und Helsinki.** [Periodicity of winter temperature in Stockholm and Helsinki.] *Fennia*, Helsinki, 78(1), **1954.** 10 p. 5 figs. (1 fold.), table, 8 refs., eqs. Also issued as: *Helsinki. Universitet. Meteorologian Laitos, Mitteilungen*, No. 73, **1954. DWB, DLC**—Average winter temperatures (Dec.–March) for Stockholm (1756–1951) and Helsinki (1832–1951) are graphically presented (moving averages) and analyzed. Periods ranging from 5 to 104 years are identified in both series. A curve containing the most significant periodicities is constructed for Helsinki and extrapolated up to 1979. *Subject Headings:* **1. Temperature periodicities 2. Winter temperatures 3. Stockholm, Sweden 4. Helsinki, Finland.**—*G.T.*

8.4–215 551.524.37:632.111

Suzuki, Seitaro and Arai, T. (both, *Training Inst. of Met. Observers*), **The cooling apparatuses especially referring to radiative cooling.** *Journal of Agricultural Meteorology*, Tokyo, 10(3/4):118–120, March **1955.** 5 figs., 2 tables, 3 refs. In Japanese; English summary p. 120. **DWB** —Some properties of frost action on a plant may be studied experimentally in the laboratory by means of the most easy way of cooling by conduction in contact with the freezing mixture. The temperature on the frost forming surface of the plant is higher than in the inside tissue of the plant when cooled in the clear night sky. It is a matter of great difficulty to realize the nocturnal cooling taking place in the open field by introducing radiative cooling process in the closed chamber. The 1st type of our apparatus consists of 2 concave aluminum mirrors facing each other at a little distance and the freezing mixture (or dry ice) and the surface to be frosted are put on each focus of the mirrors. The experimental test of this apparatus is not satisfactory due to the small scale apparatus as well as imperfectly reflecting surfaces. The 2nd type consists of 4 glass cylinders of different diameters protected by means of thermally insulating wool cloth and humid or dry air flows into its enclosed space through 4 small holes. The curves of cooling arise from the sudden freezing of the supercooled drop of dew, and of the plant sap. The other thick lined curve is due to the inflowing dry air in which only one quick temperature rise is noticeable due to the sudden freezing of the supercooled plant and not to formation of dew. The 2nd type of our cooling apparatus meets demands most sufficiently and may be recommended to some workers in need of the frost investigation. *Subject Headings:* **1. Radiation frost investigation 2. Plant freezing.**—*Authors' abstract.*

SOIL TEMPERATURE

8.4–216 551.525.5:624

Jumikis, A. R. (*Engr, Rutgers Univ., New Brunswick, N. J.*), **The method of solution of Ruckli's frost-penetration equation.** *American Geophysical Union, Transactions*, 37(2):181–184, April **1956.** fig., 2 refs., 18 eqs. **DWB, DLC** —The purpose of this article is to present the author's method of solving a non-linear differential equation given by R. Ruckli expressing the rate of frost penetration in soil. There is no standard method of solution of such a differential equation as set up by Ruckli, yet the method of solution of the non-linear differential equation, not given by Ruckli, is considered to be of great interest to the engineering profession in treating frost-penetration problems in highway and airport engineering. The author's method of solution of Ruckli's equation for the frost-penetration rate consists of the application and use of power series and the determination of the coefficients involved, thus showing how to arrive at the integral which Ruckli presents as the end result of his non-linear differential equation. The author's thought behind the showing of the method of solution of the equation is not merely to demonstrate the application of so powerful a mathematical tool as the power series for solving engineering problems. According to his belief, it also helps one better to understand the phenomena, nature, and physical processes conveyed by this equation, it enables one better to analyze the problem involved, and establishes in the reader a certain confidence when applying the end result (integral) of Ruckli's equation. In addition, the presentation of this article naturally calls attention to the important work done by Ruckli. *Subject Headings:* **1. Frost penetration 2. Engineering meteorology. I. Ruckli, R.**—*Author's abstract.*

8.4–217 551.525.5

Koloskov, P. I., **Sezonnaia merzlota pochvy.** [Seasonal freezing of soil.] *Vsesoiuznyĭ Geograficheskiĭ S'ezd, 2nd, Leningrad, 1947, Trudy*, 2:201–210, **1948.** 5 refs., eqs. **DLC**— After having defined the phenomenon, distinguished it from permafrost, and explained the individual phases of the process of freezing and thawing of soils, the author discusses the difficulties (caused by the scarcity of observation data) he experienced in the construction of a map showing the depths of soil freezing in winter in clayey soils of the European USSR, Kazakhstan and a part of southwestern Siberia. The map was made on the basis of data of less than 200 stations in Europe, 36 in Kazakhstan and 17 in west Siberia. Blanks were filled in by interpolation according to an empirical formula. The greatest depths, attaining 250 cm and more, were found in eastern Kazakhstan (region of Black Irtysh River) 50°N,

decreasing rapidly to the south and less rapidly toward the west and north. Further, the author discusses the geographical distribution of depths of freezing under bare and covered (by vegetation) soils and concludes that the kind of soil (from pure sand to heavy clay), the degree and type of the cover and the exposure and steepness of the slope can affect the depth of freezing stronger than even large differences in longitudes and latitudes of the localities. That is why the significance of local factors should be studied to a degree when it will be sufficient for the computation of reliable calculating coefficients. *Subject Headings:* **1. Soil freezing 2. Vegetation influences 3. U.S.S.R.**—*A.M.P.*

WATER TEMPERATURE

8.4–218 551.526.8:577.42:597

Bailey, Reeve M. (*Museum of Zoology, Michigan Univ.*), **Differential mortality from high temperature in a mixed population of fishes in Southern Michigan.** *Ecology*, Durham, N. C., 36(3):526–528, July **1955.** fig., 6 refs. **DWB, DLC**—A temperature of 38°C resulted in high mortality to the fishes confined in a shallow pond. At a subsequent temperature of 55°C survivors had normal powers of locomotion and activity. The mortality was differential as regards species. *Subject Headings:* **1. Mortality of fishes 2. Pond temperature effects.**—*Based on author's abstract.*

PRESSURE AND WIND

PRESSURE

See also: **Monthly means of sea level pressure** (Ger. Deuts. Wetterdienst), 8.4–22; **Streamline computation** (Bundgaard), 8.4–82; **Mean winds and temp., Marshall Is.** (Korshover), 8.4–94; **Nongeostrophic extension of Sawyer-Bushby Model . . .** (Knighting); 8.4–132; **Thermal advection at the surface, N. Hemisphere** (Berkes), 8.4–166; **Double couette flow** (Queney), 8.4–177.

8.4–219 551.541:551.551

Inoue, E. and Imai, K. (both, *Nat'l. Inst. of Agric. Sciences, Tokyo*), **Eulerian correlation of the atmospheric pressure fluctuations of medium scales.** *Meteorological Society of Japan, Tokyo, Journal, Ser. 2*, 33(4):169–173, Sept. **1955.** 5 figs., 11 refs., 12 eqs. **DWB, DLC**—Following Inoue's (1951) results concerning the pressure fluctuation spectra, the authors present an interpolation formula as

$$F(N/N_0) = \frac{20}{9}\frac{(N/N_0)^3}{\{1 + (N/N_0)^2\}^{3/3}},$$

which gives rise to a 3 power region for small frequency N and a $-7/3$ power region for large frequency. By means of Fourier transform the Eulerian correlation function is calculated which is reduced to the 4/3 power formula for small process-time t as

$$R(t/T_0) = 1 - 3.386\ (t/T_0)^{4/3},$$

comparisons of these results to Ogura-Mikakoda's (1954) theoretical ones and also to Schumann-Hofmeyer's (1942) observational ones in the atmosphere are carried out. Making use of the observational knowledge as to T_0 corresponding to the passage-time of atmospheric predominant turbulon, several remarks on the desirable instrumentation and process for the observation of atmospheric pressure fluctuations are stated. *Subject Headings:* **1. Pressure fluctuations 2. Turbulence spectrum.**—*Authors' abstract.*

8.4–220 551.543

Pramanik, S. K. and Jagannathan, P., **Climatic changes in India, Pt. 1, Rainfall.** *Indian Journal of Meteorology and Geophysics*, 4(4):291–309, Oct. **1953. Pt. 2, Temperature.** *Ibid.*, 5(1):29–47, Jan. **1954. Pt. 3, Pressure.** *Ibid.*, 6(2):137–148, April **1955. DWB.** Also issued in *International Union of Geodesy and Geophysics. Association of Meteorology, Rome, Sept. 1954, Scientific Proceedings*, p. 86–138, pub. London, Butterworth, **1956.** 12 figs.,

17 tables, 18 refs. **DWB**—For abstract on Pt. 1, *see* 6.1–274, Jan. 1955, *MAB*. For Pt. 2 *see* 6.6–229, June 1955. In Pt. 3, pressure data of the morning synoptic hour (0830IST) of 25 weather stations in Indian and surroundings have been analyzed to determine long perio pressure trends. The mean daily values of pressure from year to year are listed for randomnes secular trends are determined by falling pressure value at the different stations to orthogona polynomials by Fisher's method; trend for the uniform period 1901 to 1950 is examined, an linear trends for Jan. and July are calculated. Graphs showing mean annual pressure yea by year, maps giving linear trends in annual pressure and in Jan. and July pressure, and table containing the distribution of turning points and phase lengths in a series of mean pressur values, coefficient of orthogonal polynomials, square roots of variants accounted for by th polynomials, decade average of 8 a.m. pressure, linear trend of pressure etc., are presented *Subject Headings:* **1. Pressure data 2. Pressure variations 3. Pressure trends 4. Indi** —*I.L.D.*

8.4–221 551.543:551.51

Vítek, Vojtěch (*Prague Univ., Met. and Clim. Inst.*), **Vliv stability ovzduší na přízemí tlakové změny.** [Effect of atmospheric stability on surface pressure changes.] *Meteoro logické Zprávy*, Prague, 8(2):48–52, April 30, **1955.** 7 refs., 11+eqs. Russian and Englis summaries p. 48. **DWB**—The influence of vertical stability on the tendency at the 1000 m level is theoretically studied. The stability term in the tendency equation is discussed unde the assumption that the measure of vertical stability Γp depends on horizontal coordinate only. The influence of vertical stability is closely connected with the vertical motion fiel The application of p-system to the mathematical formulation of this relation makes it possib to determine the influence of vertical stability, nonadiabatic processes and temperature fie on the tendency at the 1000 mb surface. *Subject Headings:* **1. Pressure variations 2. Baro metric tendency equation 3. Vertical stability.**—*Author's abstract.*

8.4–222 551.543.5:551.506(261:

Rodewald, M., **Jahrestendenzen der Witterung.** [Annual tendencies of weather] *Wetterlotse*, No. 109/10:270–272, Dec. **1956.** 2 figs. **DLC**—In recent years there has been 2-yr pressure cycle in the Atlantic-European region. Track of a pressure fall center from c Newfoundland in 1951/2 to N. Russia in 1954/5 is plotted, and pressure change 1954/5 show in more detail. The tendency continued in 1955/6 and accounted for the abnormal cyclon activity in summer and fall 1956. *Subject Headings:* **1. Pressure variations 2. Weathe anomalies.**—*C.E.P.B.*

WIND AND TURBULENCE

See also: **Micromet. turbulent diffusion** (U. S. Dugway Proving Ground), 8.4–4; **Sea surface wind** (Johnson), 8.4–66; **Measuring wind velocity at sea** (Seilkopf), 8.4–67; **Radar echoes from snow** (Hitschfeld, Dennis), 8.4–87; **Mean winds over Marshall Islands** (Korshover), 8.4–94; **Turbulent pulsations of met. elements** (Krastanov), 8.4–172; **Eulerian correlation of atmos. pressure fluctuations** (Inoue, Imai), 8.4–219.

8.4–223 551.551:551.553.

*Sakagame, Jiro (*Dept. of Physics, Faculty of Science, Ochanomizu Univ.*), **On the structu of the atmospheric turbulence near the ground, (Pt. 1).** *Tokyo. Ochanomizu Univ., Natur Science Report*, 1:40–50, March **1951.** 14 figs., 3 tables, refs. **Pt. 2.** *Ibid.*, 2:52–71, No **1951.** 11 figs., 2 tables, 3 refs. **Pt. 3.** *Ibid.*, 4(2):201–212, March **1954.** 9 figs., 3 table 3 refs. **DLC**—The three reports give details of an original and extremely laborious proje for the study of the fine structure of turbulence near the ground during a sea breeze. Fir horizontal and vertical eddies were charted by using hot wire anemometers and later by usi rows of small paper-pin-wind vanes (10 rows set 5 cm apart and 12 vanes in a row 3 cm apar 90 cm above the ground, photographed by a moving picture camera 20 times a second. Th second report covers similar experiments using more sensitive vanes made of dandelion dow attached to rayon fibres mounted on glass tubes on pins supported by nails (14 rows, 5 c apart, 12 vanes to a row 3 cm apart and 17 cm above ground) photographed in both a hor zontal and a vertical plane. Individual eddies are shown to be mostly vertical; to be carri down stream by the wind with a lifetime of about 1 second, and to maintain about the sam

iameter as they increase and dissipate. The behaviour of the eddies, as they converge, was bserved and charted. In the third report a 3-dimensional frame was made to support the andelion down wind vanes and photographs were made from the side with stereo camera and ne deflections plotted. It was found that the eddies leaned forward at about a 20° angle and ere about 5 times as long as their diameters (Rankine eddies) and that they incline along nd move with the main stream. *Subject Headings:* **1. Microstructure of turbulence 2. Dandelion wind vanes 3. Paper wind vanes 4. Sea breeze turbulence.**—*M.R.*

8.4–224 551.551:551.501.3:551.513.2

Saltzman, Barry, **Equations for the study of the energetics of the larger scales of atmospheric turbulence.** Massachusetts Institute of Technology, Dept. of Meteorology, Contract F 19(604)-1000, Scientific Report, No. 5, June 15, **1956.** 28 p. table, 38 refs., 48+ eqs. **WB**—By considering the Fourier analysis of the planetary field of motion in the atmosphere is possible to define "scales" of motion and to write equations which govern the behaviour these separate scales of motion. Specifically, an equation for the rate of change of the inetic energy of a disturbance of a given wave number is presented. Such an equation, hich includes the effects of the release potential energy, friction, and the transfer of energy mong the various scales of eddies and the mean flow, can serve as a basis for studying the ay-to-day variations of the spectral distribution of kinetic energy and for computing the steady-state" atmospheric energy cycle in the domain of wave number, with the use of daily emispheric data. *Subject Headings:* **1. Turbulence scale 2. Circulation patterns.**—*Author's bstract.*

8.4–225 551.551:551.524.1

Shiotani, M. (*Railway Technical Res. Inst., Tokyo*), **On the fluctuation of the temperature nd turbulent structure near the ground.** *Meteorological Society of Japan, Journal*, Ser. 2, 3(3):117–123, July **1955.** 6 figs., 3 tables, 21 refs., 9 eqs. **DWB, DLC**—Vertical flux of eat and momentum in the lowest layer, which are significant quantities in the micrometeorogy, are expressed symbolically as $\rho C_p \overline{w'T'}$ and $\rho \overline{u'w'}$ respectively, (where u' and w' are uctuation components of velocity and T' is temperature fluctuation). Lately, due to the rogress of instrumentation and calculating machine, the flux has come to be measured in its riginal form, that is, as the cross-correlation of two fluctuating quantities. In this procedure, becomes a significant problem to decide the sampling time and time lag of the measuring nstrument. To solve the above problem, structures of u', w'- and T'-fluctuations are measured nd analysed. In the range of small eddies, similarity hypothesis in the locally isotropic urbulence holds well in three fluctuating quantities. The author stresses that sampling time 1 minute, though it seems by far shorter than the ordinarily used one, is sufficient to cover ne large eddy which is effective to the gradient diffusion. It is noted that in the large eddy hich is effective to the turbulent transfer of heat the state of turbulence deviates very far om the local isotropy. *Subject Headings:* **1. Micrometeorological turbulence 2. Temerature fluctuations 3. Eddy flux.**—*Author's abstract.*

8.4–226 551.551:519.24

Taylor, R. J. (*Div. of Met. Physics, C.S.I.R.O., Melbourne*), **Some observations of wind elocity autocorrelations in the lowest layers of the atmosphere.** *Australian Journal of hysics*, Melbourne, 8(4):535–544, Dec. **1955.** fig., 5 tables, 11 refs., eqs. **DLC**—From ind velocity observations in the lowest layers of the atmosphere, mean square velocity differnces over a time interval at a point fixed in space are derived and their variation with the me interval is considered. The magnitude of these mean square differences is related to the te of viscous dissipation of energy and to the shearing stress. On the average, fair agreement ith predictions from the dimensional arguments of the theory of local isotropy is shown even hough the results pertain to eddy sizes outside the inertial subrange as usually defined. *Subject eadings:* **1. Gustiness 2. Turbulence correlation functions.**—*Author's abstract.*

8.4–227 551.551:523.85

von Hoerner, Sebastian, **Beitrag zur Turbulenztheorie der Spiralnebel.** [Contribution the turbulence theory of spiral nebula.] *Zeitschrift für Astrophysik*, 32(1):51–58, **1953.**

6 figs., 14 refs., 15 eqs. **DLC**—A theoretical study of the effect of rotation on a stable rotating non-rigid and turbulent gas cloud. *Subject Heading:* **1. Spiral nebulae.**—*C.E.P.B.*

WIND DISTRIBUTION AND WIND VARIATIONS

See also: **Navy base planning data, Shakhalin and Kurile Islands,** (Japan, Hydro. Dept.), 8.4 61; **Nongeostrophic wind effects in numerical forecasting** (Knighting), 8.4–132; **Atmos. turbulence near the ground** (Sakagame), 8.4–223; **Appraisal of rainfall occurrence, Bombay and Hyderabad States** (Hariharan), 8.4–270.

8.4–228 551.553.21:551.577.3(52)

Sato, T., **A statistical study of precipitation due to monsoon near Japan, Pt. I.** *Sendai, Japan. Central Meteorological Observatory, Bulletin of the Meteorological Society for Research of Tohoku District,* 6(1):54–62, Nov. **1951.** 17 figs., 2 tables, 6 refs., 8 eqs. In Japanese; English summary p. 252. **Pt. 2.** *Journal of Meteorological Research,* Tokyo, 5(6):495–500, July **1953.** 4 figs., table, refs. English summary p. 495. **DWB**—The author investigated the relation between durability of monsoon and continuous precipitation and obtained the following results: Snow cover and number of days with snow cover relate to temperature and amount of precipitation. Precipitation due to monsoon begins and ends earlier in higher latitudes; it is an exceedingly local phenomenon and seems to have a certain concern with the relation between falling velocity of snow and ascending velocity of air at the time when monsoon flows over mountains. Durability of monsoon type is largest in Jan., second in Feb. and smallest in Dec. When a low moves north, monsoon is durable, when it moves south, it is of short duration. Much precipitation accompanies durable monsoon type and excessive precipitation will occur when a low moves from the Japan Sea into the Okhotsk Sea and becomes stationary there. If the mean duration of monsoon type in a month is longer, the mean temperature is lower and the total precipitation much larger. *Subject Headings:* **1. Monsoon precipitation 2. Japan.**—*Author's abstracts.*

8.4–229 551.553.6:551.578.4

Nikolaev, V. A. and Rauner, IU. L., **Rozy vetrov na snegu.** [Wind roses on the snow.] *Priroda,* Moscow, 44(12):109–110, Dec. **1955.** 2 figs. **DLC**—In the course of snow measurements in the "Black Lands" of Astrakhan and Stavropol Provinces in the late winter of 1954, the author observed thousands of three-pronged snow dunes similar to the tridactylous feet of giant birds. Each of the dunes had a clump of sod in the center protruding from under the snow from which rays up to 1–1.5 m long extended in S, SE, and SW directions. The uniformity of direction of the rays was astonishing. A later analysis of meteorological data from the station "Putevoe" showed that from Dec. 1953 to Feb. 1954 north winds were predominant, and all snowfall was connected with northerly winds. The author concludes that the orientation of the rays of the three-pronged snow dunes reflected the character of winds and precipitation and that they should be considered as natural precipitation and wind roses. He points out that the local population uses them as natural compasses in their winter travels over the snow covered expanses. *Subject Headings:* **1. Snow wind roses 2. Astrakhan Region, U.S.S.R. 3. Stavropol Region, U.S.S.R.**—*A.M.P.*

8.4–230 551.553.8:551.554(716)

Lee, R., **An investigation of unusually strong low level winds over Halifax, May 19, 1955.** *Canada. Meteorological Div., Cir.* 2711, Tec. 225, Oct. 27, **1955.** 6 p. 5 figs. **DWB**—Unusually strong low-level winds were indicated by two pilot balloon ascents and several aircraft reports at Shearwater, Nova Scotia, on 19 May, 1955. These reports are studied in relation to the synoptic picture in order to determine reasons for their development with the following results. a) The m.s.l. geostrophic wind reached 90 kn for a four-hour period over Nova Scotia, due to differential pressure tendencies over the northwestern and southeastern parts of the province. b) This differential pressure change is attributed to warm and cold air advection. c) Both the thickness pattern and aviation weather reports lend evidence for conclusion (b). d) The very high wind shear above 5000 ft occurred in the maritime arctic frontal surface. *Subject Headings:* **1. Gales 2. Wind shear 3. Halifax, Nova Scotia.**—*Author's abstract.*

SPECIAL WINDS

See also: **Mean winds and temperatures, Marshall Is.** (Korshover), 8.4–94; **Trade wind heat balance** (Riehl), 8.4–178; **Glacial-met. work, 1952** (Hoinkes), 8.4–256.

8.4–231 551.555.9:63.061.3

Vitvitskiĭ, G. N., **Diskussiia o proiskhozhdenii sukhoveev i sviazannykh s nimi atmosfernykh iavleniiakh na soveschanii, organizovannom Institutom Geografii AN SSSR.** [Discussion on the origin of dry winds and associated atmospheric phenomena at a conference organized by the Institute of Geography of U.S.S.R. Academy of Sciences.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geograf.*, No. 2:90–96, March/April **1954. DLC**—A detailed report of the proceedings of the conference, Dec. 21–24, 1953. The more than 20 reports and communications can be divided in 3 groups: 1) hydrometeorological and agrometeorological phases of the dry winds; 2) questions of elucidating the conditions leading to the origin of dry winds and geophysical investigations of the hydrometeorological regime of the lowest air layer and the soil and their interaction and 3) preventive measures. The reports were followed by discussions in which representatives of the leading meteorological and agricultural institutions and universities took part. *Subject Headings:* **1. Sukhovei 2. Agrometeorology conferences 3. Hydrometeorological studies 4. U.S.S.R.**—*A.M.P.*

8.4–232 551.555.9:551.571.35

Zavarina, M. V., **Kholodnyĭ sukhoveĭ.** [Cold dry wind.] *Priroda*, Moscow, 44(12):110, **DLC**—An unusual case of a sharp drop of air humidity was recorded at the meteorological station of "Nikotskiĭ Sal" near Yalta (Crimea) on the night of Oct. 19, 1949. Although the climate of the Crimean coastline is, in general, dry and days with relative humidity below 25% and even 20% happen every year, on Oct. 19, 1949 the instrument in the meteorological screen recorded a relative humidity of 4% at 1 a.m., of 3% at 7 a.m., and even 1% at 8 a.m. This was followed by a steady increase of humidity. Such a short and sharp drop of humidity is characteristic of the dry winds which blew with a speed of 12 to 20 m/sec from NE. Although the air temperature was 7–9°C, the wind inflicted some damage to the lemon and eucalyptus trees. A study of weather charts showed that the dry wind came from the Barents Sea area. *Subject Headings:* **1. Sukhovei 2. Humidity drop 3. Crimea.**—*A.M.P.*

8.4–233 551.555.9(47)

Zavarina, M. V., **Sukhovei iugo-vostoka evropeĭskoĭ chasti SSSR.** [Dry winds of southeast European U.S.S.R.] (In: Institut Geografii [and] Institut Lesa, **Mikroklimaticheskie i klimaticheskie issledovaniia v Prikaspiĭskoĭ Nizmennosti.** Moscow, **1953.** p. 79–85. refs.) **DLC**—An evaluation of the origin and nature of dry winds (sukhovei) based on a careful study of Russian literature as well as on personal investigations of the author carried out in 1950–1951 is presented. The author comes to the conclusion, which is based on results of most recent studies, that descending air streams in the atmosphere do not produce by themselves the dry-wind current, but accelerate only the transformation of air coming from north, north-west and west. The process of transformation of air masses in the southwest of European U.S.S.R. is the predominant process and plays a decisive part in the formation of dry winds. The transformation of air masses in the lower, subinversion layer is determined by the effect of the underlying surface. A change there brings a change in transformation of air masses. *Subject Headings:* **1. Sukhovei 2. Air mass transformation 3. Sukhovoi winds 4. European U.S.S.R.**—*A.M.P.*

WIND EFFECTS

See also: **Anemometer for measuring wind pressure** (Nishimura, Suzuki) sukhovoi winds, **8.4–115.**

8.4–234 551.311.128:551.556(52)

Arakawa, H., **An unseasonable but severe avalanche on Mount Fuji.** *Weather*, 11(12): 388, Dec. **1956.** cover photo. **DWB**—In a violent storm on Nov. 28, 1954, surface wind reached 28.8 m/s (51 m/s in a gust) on Hachijo Is. A great avalanche occurred on Mt. Fuji, killing 15 climbers, believed to have been set off by the wind. It is the only outstanding

avalanche recorded in Nov. (221 in Dec.–May, 1926–46). *Subject Headings:* **1. Avalanches 2. Wind effects 3. Japan.**—*C.E.P.B.*

8.4–235 591.17:598.2:551.556

Groebbels, Franz, **Vogelflug und Wind.** [Bird flight and wind.] *Naturwissenschaftliche Rundschau*, 9(12):470–474, Dec. **1956.** table. **DWB**—Four types of flight are distinguished; characterized by a "rowing" action (pigeon), rowing with static uplift (sea gull), lifting (kingfisher, etc.) and dynamic gliding (only the albatross). The physiology of each, and the use made of wind and thermal up-currents, are described. The relation between flight and wind direction is discussed; migrations are often slightly against the wind. Flight formations often take a wedge form, especially against the wind, but precisely how this helps is not known. *Subject Headings:* **1. Bird flight 2. Wind utilization by birds.**—*C.E.P.B.*

8.4–236 551.556:532.593

Nikiforov, E. G., **K eksperimental'nomu izucheniiu mekhanizma zarozhdeniia pervichnykh vetrovykh voln.** [Experimental study of the mechanism of production of primary wind waves.] *Akademiia Nauk SSSR, Doklady*, 105(1):87–89, Nov. 1, **1955.** 2 figs., table, 4 refs. **DLC**—The mechanism producing wind waves is considered to be atmospheric turbulence in the immediate vicinity of surface of the water namely in the boundary wind layer. When the laminar boundary layer of air forming on the waters of a windward shore is sufficiently fine, the laminar flow in the waters becomes stable. Impulses received by the laminar flow layer during collision with turbulent wind currents bring about wave like disturbances only in the boundary layer. But with increasing thickness of the bordering layer the wave-like disturbances intensify until at a critical thickness of the boundary layer points of inflection appear on the velocity diagram of the laminar flow. Owing to the instability of a flow with such an inflection point, the laminar layer is transformed into an eddy with the axis parallel to the water surface. An experiment testing this hypothesis is described and confirmatory data are presented. *Subject Headings:* **1. Wind wave formation 2. Turbulence effects.** —*I.L.D.*

8.4–237 623.55:551.556

Roth-Desmeules, Ernst, **Zur Berechnung der Geschossabweichung unter dem Einfluss eines Seitenwindes.** [Calculation of projectile deviation under the influence of a side wind.] *Zeitschrift für angewandte Mathematik und Physik*, Basel, 6(6):494–497, **1955.** fig., 7 eqs. **DLC** -The first order correction which should be made to the z-coordinate of the standard trajectory of a projectile to account for a cross-wind is given. It is shown that this formula is a very good approximation also for angles of departure near 90°. *Subject Headings:* **1. Ballistics 2. Wind effects on projectiles.**—*Author's abstract.*

8.4–238 551.556:551.481:551.583.3(798)

Schenk, Erwin, **Windorientierte Seen und Windablagerungen in periglazialen Gebieten Nordamerikas.** [Wind-oriented lakes and eolian deposits in the periglacial regions of North America.] *Erdkunde*, 10(4):302–306, Dec. **1956.** 3 figs., 11 refs. English summary p. 302. **DWB**—R. F. Black and W. L. Barkdale reported (1945–1951) several thousand rectangular or oval lakes from a few meters to 15×4–5 km, 0.5–5 m deep, in northern Alaska. They are all oriented N9°W–N21°W (mean N12°W) and are obviously wind-formed, but south winds are now rare in summer. They are attributed to wave erosion under the influence of prevailing SSE winds in the Pleistocene, which also formed dune and loess deposits. Periglacial lakes and swamps in other regions are similarly oriented. *Subject Headings:* **1. Wind effects on lakes 2. Quaternary period 3. Alaska.**—*C.E.P.B.*

8.4–239 551.556:532.593

Walden, Hans, **Zur Bandbreite des Periodenspektrums in der Dünung.** [On the bandwidth of the period spectrum of swell.] *Deutsche Hydrographische Zeitschrift*, 9(3):132–136, **1956.** 3 figs., 4 refs. German, English and French summaries p. 132. **DWB**—The wind first causes small short waves, but as it continues, longer waves arrive from a distance. The period spectrum results from a combination of these. The development of a spectrum from

3–84 hrs after the setting in of a wind at a distance of 0–1000 sea miles is calculated. *Subject Heading:* **1. Wind-wave relationships.**—*C.E.P.B.*

8.4–240 551.556.4:595.78

Seilkopf, H., **Eine biologisch wirksame Wetterlage auf der Nordsee im Spätsommer 1956.** [A biologically effective weather situation in the North Sea in late summer 1956.] *Wetterlotse*, No. 108:237–239, Nov. **1956.** fig. **DLC**—In late summer 1956 swarms of death's head moths came from the Mediterranean across Europe to the North Sea and Baltic. Reports from ships in the North Sea about Sept. 3 are related to a synoptic chart showing an easterly wind current to NE of a depression over the Channel. Other cases are referred to. *Subject Headings:* **1. Wind transport 2. Butterfly migrations.**—*C.E.P.B.*

UPPER AIR WINDS

See also: **High altitude radiosonde flights** (Lowenthal, Arnold), 8.4–25; **Streamline computation** (Bundgaard), 8.4–82; **Mean winds and temperatures, Marshall Is.** (Korshover), 8.4–94; **Upper air circulation** (Serra), 8.4–176; **Arctic jet stream** (Godson), 8.4–179; **Jet stream-tornado relationships** (Lee), 8.4–183; **Jet streams, Japan** (Nojima), 8.4–184.

8.4–241 551.557:551.508.857

Anderson, A. D. and Hoehne, W. E., **Experiments using window to measure high-altitude winds.** *U. S. Naval Research Laboratory, NRL Report*, No. 4682, Jan. 10, **1956.** 9 p. 8 figs., 2 tables, chart, 4 refs. **DLC**—Strips of metal foil (window), dispersed by balloon and aircraft, have been tracked by radar to measure wind velocities at altitudes up to 74,000 ft. These wind velocities have been compared with those measured over the same altitude range by GMD-1A equipment and radar-target tracking. The results indicate promise for obtaining high-altitude winds by this new technique. Further experiments envisioned for the altitude range from 100,000 to 200,000 ft will necessitate the use of rockets to carry and eject the window. *Subject Headings:* **1. Metal foil (window) dispersion 2. Radar vertical motion measurements.** —*Authors' abstract.*

8.4–242 551.557(93)

Farkas, Edith, **Vertical distribution of linear momentum over Nandi, Auckland and Invercargill.** *New Zealand. Meteorological Service, Technical Note*, No. 100, July 16, **1953.** 5 p. 3 figs., 3 tables, 3 refs. **DWB**—The mean vertical distribution of linear momentum over Nandi, Auckland and Invercargill is presented by means of tables and diagrams for each of the four seasons. The distributions appear to be very similar at Nandi and Auckland, but Invercargill shows marked differences. *Subject Headings:* **1. Wind profiles 2. Fiji 3. New Zealand.** —*Author's abstract.*

8.4–243 551.557:551.513(459)

Serra, Antonio, **Su alcune caratteristiche stagionali delle correnti atmosferiche nell'alta troposfera e bassa stratosfera sull'isola di Sardegna e sul Mediterraneo occidentale.** [Some seasonal characteristics of the atmospheric circulation in the upper troposphere and the lower stratosphere over Sardinia and the Western Mediterranean.] *Rivista di Meteorologia Aeronautica*, Rome, 15(3/4):3–22, July/Dec. **1955.** 4 figs., 10 tables, 45 refs. French, English and German summaries p. 3. Also his: **Il vento medio nell'alta troposfera e nella bassa stratosfera in Sardegna.** [The mean wind in the upper troposphere and the lower stratosphere over Sardinia.] *Ibid.*, 15(3/4):23–29, July/Dec. **1955.** 2 figs., 3 tables, 13 refs. French English and German summaries p. 23. **DWB, DLC**—From data obtained in 1890 radio soundings between 1946 and 1954 at Cagliari Station, percentage seasonal frequencies of the wind at the 500, 300, 200, 100, and 50 mb levels for sixteen directions and for given ranges of wind speed are tabulated and graphically presented. The seasonal analysis confirms the influence of the jet stream in the Western Mediterranean at a level between 300 and 200 mb, as well as the existence of an easterly current during the summer period at levels above 100 mb.— In the second paper the mean wind and its W–E and N–S components at 500, 300, 200, 100 and 50 mb are worked out, showing the predominance of the west component up to 100 mb and

of the east component between 100 and 50 mb during the hot season. *Subject Headings:* **1. Upper air winds 2. Upper air circulation 3. Sardinia.**—*Author's abstracts.*

8.4–244 551.557:551.506.7

§Yamada, H.; Nakamura, S.; Matsuhashi, S. and Furukawa, K., **Mean charts of upper air in winter over Japan.** *Tateno, Japan. Aerological Observatory, Journal*, 5(4):283–322, March **1954.** mostly figs. and tables. **MH-BH**—Mean 700, 500, 300, 200 and 100 mb charts for Japan for each month Nov. 1949–April 1953, wherever at least 20 observations a month were available, and normal charts for each level and each month, are given for Japan and wind data for Sapporo, Akita, Tateno, Yonago and Kagoshima, and temperature and height of pressure surfaces for Wakkanai, Sendai, Wajima, Shionomisaki, and ships "Extra" and "Tango" as well, given in tables for each month. Wind speeds in "Upper winds over the world" by C. E. P. Brooks (1950) are considered too low over Japan. Data are based on 0300Z (noon in Japan) observations. *Subject Headings:* **1. Monthly mean upper air charts 2. Upper air winds 3. Japan.**—*M.R.*

8.4–245 551.557.3:551.510.535:551.590.25

Greenhow, J. S. and Neufeld, E. L., **The height variation of upper atmospheric winds.** *Philosophical Magazine*, Ser. 8, 1(12):1157–1171, Dec. **1956.** 9 figs., 11 refs. **DWB**—Radio echoes from meteor trails are especially suitable for determining wind profiles at 85–100 km. Observations at Jodrell Bank in 1954–55 giving N and E components are described. Diurnal variation shows a well marked 12-hr wave and a smaller 24-hr wave, both increasing upwards. The annual variation of the 12-hr wave is shown by harmonic dials. The change of amplitude of the 12-hr wave over 10 km height in winter is 20–30 m/s in both N and E components at 90–100 km but much less at 85–95 km; it decreases nearly to zero in summer. The rate of phase change of 12-hr component also decreases from winter (7°/km) to summer (3°/km). At 100 km wind is towards E in summer and winter and towards W in spring and fall, but at 85 km it remains E in fall. The 12-hr oscillation is compared with theoretical height variations due to thermal and tidal effects of the sun (after Wilkes) and with observations at other levels; agreement is good. It is inferred by extrapolation that the dynamo region in temperate latitudes is at a height of about 135 km. *Subject Headings:* **1. Ionospheric wind profiles 2. Meteor ionization trails 3. Dynamo theory of ionosphere 4. Jodrell Bank, Manchester, Eng.**—*C.E.P.B.*

8.4–246 551.557.3

*Miller, Paul H., **Time-variability study of winds aloft at the Naval Ordnance Test Station, China Lake, California.** *U. S. Naval Ordnance Test Station, NAVORD*, No. 4952, Oct. 1, **1955.** 66 p. 35 figs., 18 tables, 7 refs. **DWB**—Upper air wind data obtained in 1954 and 1955 at the Naval Ordnance Test Station (35°46′N, 117°41′W, 2215 ft elev) in south central California are analyzed to show the time-variability of winds at 1000 ft elevation up to 47,000 ft and over period of 1 hour to 8 hours between ascents. Results are shown in tables, graphs and histograms. The winds are strongly affected by the High Sierras to the W and NW and by the lee eddies which form when winds are strong over the range. The winds show greater variability up to 10,000 ft above sea level than at higher elevations. Directions and speeds vary the most in the middle of the day and least in evening and early morning; greatest in summer and least in winter, except during frontal passages. Winds are strongest and steadiest through passes and over ridges when air is stable. *Subject Headings:* **1. Upper air wind variability 2. Orographic effects on upper air winds 3. China Lake, Calif.**—*M.R.*

VERTICAL MOTION

See also: **Mountain wave flying** (U. S. W. B.), 8.4–64; **Double couette flow** (Queney), 8.4–177.

8.4–247 551.558:551.594.7

Moler, W. F. and Arvola, W. A., **Vertical motion in the atmosphere and its effect on VHF radio signal strength.** *American Geophysical Union, Transactions*, 37(4):399–409,

Aug. 1956. 10 figs., 5 refs., 6 eqs. **DWB, DLC**—The hypothesis is proposed that the vertical gradient of the refractive index is strongly affected by the vertical motion in the atmosphere. It is shown that changes in this gradient are due principally to changes in the moisture stratification and temperature lapse rate resulting from the vertical velocity and its horizontal gradient within the air mass. Mean radio signal strengths are plotted against the time position of 500-mb troughs and ridges relative to the radio link. A series of 500-mb charts is given, with the vertical velocity field obtained by the Sawyer-Bushby method. The vertical velocity over two radio links is compared with the signal strength. Cross-sections taken through several of the troughs illustrate the stratification changes on the forward and rear sides of the troughs due to vertical motion. *Subject Headings:* **1. Vertical motion 2. Ultra-short wave propagation.**—*Authors' abstract.*

8.4–248 551.558.21:551.508.822

Corby, G. A., **A preliminary study of atmospheric waves using radiosonde data.** *Royal Meteorological Society, Quarterly Journal*, 83(355):49–60, Jan. **1957.** 16 figs., 5 refs., 3 eqs. Summary in *Nature*, London, 179(4563):762, April **1957. DWB**—From ascents at Leuchars, Stornoway, Aldergrove and Liverpool occasions when rate of ascent varied by ±300 ft/min or more were replotted as vertical currents. These were often periodic along path of balloon (examples shown) and suggested gravity waves of orographic origin. They were confirmed by radar data, and sometimes occurred in successive ascents and at more than one station. In one case upward velocity reached 1000 ft/min, but maximum frequency <400 ft/min. They were mostly in layer 5000–10,000 ft. They tended to occur with fronts and with winds from high ground. Wave length increased with mean wind speed ($r=0.91$). Greatest vertical velocity was with wave length of about 8 mi. Modification of apparent temperature by waves is discussed. (*See also* 8.1–241, Jan. 1957, *MAB.*) *Subject Heading:* **1. Lee waves.**—*C.E.P.B.*

AQUEOUS VAPOR, HYDROMETEORS AND HYDROMETEOROLOGY

HUMIDITY

See also: **Lithium chloride Dewcel for measuring dew point gradient** (Tanner, Suomi), 8.4–117; **Cold, dry wind** (Zavarina), 8.4–232.

8.4–249 537.5 551.571:551.594.22

Kohrmann, Wilfried, **Der Einfluss der Luftfeuchtigkeit auf den elektrischen Durchschlag in Luft.** [The influence of air humidity on electrical breakdown of air.] *Annalen der Physik*, Ser. 6, 18(5/8):379–384, **1956.** 6 figs. Also: Schröder, G. A., **Der Einfluss der Luftfeuchtigkeit auf die Durchbruchspannung einer Plattenfunkenstrecke.** [The influence of air humidity on the breakdown potential of a plate spark gap.] *Ibid.*, p. 385–386. fig. **DLC**—The first paper explains the discrepancy between standard values and recent measurements of the static breakdown tension of air by the effect of air humidity. For gaps between plates of 0.5–2 cm the breakdown field strength increases from 16.4–55.8 to 16.8–57.6 kV with increase of vapor pressure from 0–10 mn at 20°C. Measurements of field build-up are brought in to explain the mechanism. With small excesses of tension a Townsend mechanism with photoelectric action at the cathode is effective, but with greater excess field channel formation occurs, the transition being at lower excesses with increasing water vapor. The second paper shows a similar increase of breakdown tension for plate gaps of 4–5 cm. *Subject Headings:* **1. Humidity effects 2. Electrical discharges.**—*C.E.P.B.*

8.4–250 551.571:699.8

Long, Wayne E. and Giesecke, F. E., **Some observations on thermal research data obtained from the Acme Ceramic Housing Project at Austin, Texas.** (In: Mid-Southwest Conference on Tropical Housing and Building, Austin, Texas, April 1952, **Proceedings,** p. 85–104, Austin, [**1952?**]. 10 figs.) **DWB**—The results of experimental data on the humidity and thermal characteristics of houses in relation to outdoor moisture and heat conditions of the

environment. Graphs show the daily variation of relative humidity and of specific humidity and of temperature within the experimental houses and in the outside air, are presented. The physics of heat flow through walls and the effects of thermal capacity and its extended time lag are discussed. *Subject Headings:* **1. Humidity control in houses 2. Indoor climates.** —*I.L.D.*

8.4–251 551.571.3:632.7:595.7

Barlow, F. and Hadaway, A. B., **Effect of changes in humidity on the toxicity and distribution of insecticides sorbed by some dried soils.** *Nature*, London, 178(4545):1299–1300, Dec. 8, **1956.** 2 tables, 4 refs. **DWB**—The lethal effectiveness of insecticide-treated mud blocks on mosquitoes in Uganda was found to increase very greatly as humidity rose from 40–90%. This is explained by more rapid absorption of water than of insecticide at high humidities, combined with increased mobility of insecticide molecules. *Subject Headings:* **1. Humidity effects 2. Insect control 3. Mosquitoes.**—*C.E.P.B.*

8.4–252 551.571.3:551.573

Minina, L. S., **Izmenenie vlagosoderzhaniia vozdushnoĭ massy pod vliianiem podstilaiushcheĭ poverkhnosti.** [Variation of moisture content of air masses under the influence of the underlying surface.] *Meteorologiia i Gidrologiia*, Leningrad, No. 5:30–35, Sept./Oct. **1955.** 2 figs., 5 refs. **DWB, DLC**—After considering briefly some evaporation rates from the earth surface at various points in the USSR, the author examines the question of the additional humidification of the atmosphere from the underlying ground surface under favorable evaporation conditions. The diurnal humidification of air from moisture evaporated from the soil is investigated with the aid of two examples. In one, dry air enriched with moisture led to the formation of fogs and mists in the night and morning hours and cumulus clouds and weakening of the dry winds during the day; in the other an increase in the moisture content of warm air caused increased cloudiness and some rain in a frontal region. *Subject Headings:* **1. Humidity variations 2. Evaporation rate 3. Hydrologic cycle 4. U.S.S.R.**—*I.L.D.*

8.4–253 551.571.4:551.585

Zhegnevskaia, G. S., **K voprosu o klimaticheskikh faktorakh uvlazhneniia iuga evropeĭskoĭ chasti SSSR.** [Climatic humidity factors affecting the south of the European U.S.S.R.] *Vsesoiuznoe Geograficheskoe Obshchestvo, Izvestiia*, 86(6):537–542, Nov./Dec. **1954.** 2 figs., 10 refs. **DLC**—In this quantitative evaluation of the moisture factors, the author discusses the aridity index of Dokuchaev, the coefficient of humidity of N. N. Ivanov, the rain factor of Lang, etc. The inadequacy of Lang's rain factor and of de Martonne's aridity factor is pointed out. Budyko's drought index, R/Lr where r is mean annual precipitation, R mean individual balance and L—latent heat of evaporation, is used to analyze the atmospheric humidity condition of the south European part of the U.S.S.R. The author presents a map showing isolines of the R/Lr index and discusses the variation of water balance and soil moisture from May to Aug. *Subject Headings:* **1. Drought index 2. Aridity index 3. Humidity profiles 4. European U.S.S.R.**—*I.L.D.*

8.4–254 551.571.7

Hutchings, J. W., **Water-vapour flux and flux-divergence over southern England: summer 1954.** *Royal Meteorological Society, Quarterly Journal*, 83(355):30–48, Jan. **1957.** 3 figs., 4 tables, 22 refs. **DWB**—Eastward and northward fluxes of water vapor were computed for 10 levels, surface to 350 mb, at Liverpool, Hemsby, Crawley and Camborne, June through Aug. 1954, from twice-daily aerological data. Eastward transfer reached a maximum of 381–527 g/cm/100 mb/s at about 950 mb; it was mainly advective. Advective and eddy transfers to N and S both occurred, and were nearly equal. At 350 mb all transfers were small. There was a net inflow of 31 g/cm² in the region below 850 mb and outflow of 23 g/cm² above. Allowing for storage, this gave a surplus of precipitation over evaporation of 7 g/cm² compared with 6 from precipitation and evapotranspiration data. Vertical transfer of water vapor calculated from mean vertical velocities is too small, and most of upward transfer must be by turbulence and convection. *Subject Headings:* **1. Water vapor transport 2. England.**—*C.E.P.B.*

EVAPORATION AND EVAPOTRANSPIRATION

See also: **Water balance** (Thornthwaite, Mather), 8.4–27; **Moisture content of air masses . . .** (Minina), 8.4–252.

8.4–255 551.573:633.51(62)

Balls, W. Lawrence, **Water-loss from vegetation.** *Weather*, 11(12):402–403, Dec. **1956.** 7 refs. **DWB**—Water loss from a cotton crop in Egypt was 40–50 tons/acre/day, but evaporation from a water surface is only 4.1 mm or 17 tons/acre/day. Transpiration measurements on leaves gave 0.76 mg/cm²/min; a small entire plant of <600 cm² leaf area lost water at 11 g/hr. *Subject Headings:* **1. Evapotranspiration 2. Cotton 3. Egypt.** —*C.E.P.B.*

8.4–256 551.573:551.311.12 551.555:551.311.12

Höinkes, H., **Über glazial-meteorologische Arbeiten im Sommer 1952.** [On glacial-meteorological work in summer 1952.] *Akademie der Wissenschaften, Vienna. Math.-Naturwiss. Klasse, Anzeiger*, No. 15:1–7, **1954.** 2 figs., 4 refs. **DWB**—Ablation studies of ice on the Vernagtferner (2969 m) continued on July 15–Aug. 9, 1952. On 13 days amount was 57 cm ice (51.3 cm water), nearly all 6–18 h. It was greatest (least) on days of least (most) cloud and maximum (minimum) global radiation. Relation to air temperature was less obvious. Radiation balance accounted for 84% of observed ablation. Mean albedo 0.38 but up to 0.8 with fresh snow. Wind speed at 20, 75 and 140 cm increased with log $(h+0.15)$ cm but at 257 cm there was a decrease probably because of a surface flow of cold air. The heat balance of ice at night is discussed; temperature below 15 cm deep was constant at 0°C; heat passing into the air was partly due to freezing of water in cavities. *Subject Headings:* **1. Glacial ablation 2. Glacier winds.**—*C.E.P.B.*

8.4–257 551.573:551.577(54)

Jayarama, M. V. and Balasubramanian, C. (*Agricultural Met. Soc., Coimbatore*), **Evaporation and rainfall at Coimbatore.** *Science and Culture*, Calcutta, 21(5):262–263, Nov. **1955. DLC**—The authors fail to find significant log-relationships between evaporation and rainfall such as L. D. Mahajan (*Science and Culture* 1951, *see* 3.5–229, May 1952, *MAB*) found between evaporation one season and rainfall the next or evaporation one month and rainfall 2 months later (at Patiala). Using data for Coimbatore Agrometeorological Observatory for 1951–4 (38 months), the authors found a high negative correlation (-0.6291 ± 0.1296) between evaporation and rainfall the same month but no significant correlation ($+0.1273\pm0.1675$) between evaporation one month and rainfall the next, and a high negative correlation between evaporation and precipitation in the same fortnight and a bad correlation between successive fortnights ($r=\pm0.1287\pm.1153$). Seasonal correlations have not been worked out yet as records are not long enough. *Subject Headings:* **1. Evaporation-rainfall correlations 2. Long range precipitation forecasting 3. Coimbatore, India. I. Mahajan, L. D.** —*M.R.*

8.4–258 551.573:551.481(676)

Walker, H. O., **Evaporation from Lake Victoria.** *Weather*, 11(12):382–384, Dec. **1956.** photo, 3 tables, 6 refs. **DWB**—Annual evaporation from the lake is discussed from the limited data available and estimated as 60–65″ (most probable value 62″). The monthly values vary from 10″ in Jan. and March to 7″ in May, June and July. *Subject Headings:* **1. Evaporation from lakes 2. Lake Victoria, East Africa.**—*C.E.P.B.*

CONDENSATION

See also: **Dew forecasting** (Aujeszky), 8.4–139; **Influence of impurities on icing** (Albani), 8.4–141; **Operation Overseed** (Gardner), 8.4–142; **Sublimation nuclei** (Mossop), 8.4–143; **Halo and ice crystals** (Klinov), 8.4–323; **Aerosol electrification** (Woessner, Gunn), 8.4–326.

8.4–259 551.574.1:551.577.11

East, T. W. R., **An inherent precipitation mechanism in cumulus clouds.** *Royal Meteorological Society, Quarterly Journal*, 83(355):61–76, Jan. **1957.** 9 figs., 2 tables, 32 refs., 7 eqs.

DWB—In fair-weather cumulus droplets do not exceed 18μ radius but in heavy cu they extend to 100μ or more. As cloud matures liquid water content increases and droplet population decreases. Collision by gravity is too slow to account for this growth. Simultaneous condensation and coalescence in an updraught of 1–10 m/s can produce 50μ droplets in 36–10.5 min at a liquid mixing ratio of 3.5–6.8 g/kg, in agreement with initial radar echoes. *Subject Headings:* **1. Precipitation formation 2. Cumulus cloud structure.**—*C.E.P.B.*

8.4–260 551.574.1 :061.3

Mason, B. J., **The nuclei of atmospheric condensation.** *Nature*, London, 178(4545):1274–1276, Dec. 8, **1956. DWB**—Account of the Second International Symposium on Condensation Nuclei at Basle and Locarno on Oct. 1–4, 1956. Opening, B. J. Mason reviewed the present state of knowledge. Other papers dealt with effect of radioactive particles, methods of measuring nucleus concentration, role of nuclei in cloud formation and electrical conductivity and chemical analysis of rain water and cloud droplets, origin and diffusion of nuclei. *Subject Headings:* **1. Condensation nuclei 2. Conferences.**—*C.E.P.B.*

8.4–261 551.574.1 :551.578.11

Pearcey, T. and Hill, G. W., **A theoretical estimate of the collection efficiencies of small droplets.** *Royal Meteorological Society, Quarterly Journal*, 83(355):77–92, Jan. **1957.** 7 figs., 2 tables, 10 refs., 10 eqs. **DWB**—The effective collision cross-sections between pairs of small water droplets, falling freely through air under the influence of gravity, have been computed on the assumption of hydrodynamical effects alone being important. It has been assumed that each droplet tends to fall freely at its terminal velocity with respect to the surrounding medium, which also moves under the influence of the motion of a neighbouring droplet. By the use of previously computed fields of flow of a viscous medium around a uniformly translated sphere, the trajectories of motion of one droplet with respect to another were computed for a range of droplets having radii between 4μ and 200μ. It is found that the collision cross-sections increase to values considerably greater than the corresponding geometrical cross-section as the droplets approach equality of size. As the difference in size increases, the collision cross-section decreases to values close to the geometrical cross-section, and, finally, decreases to zero. For any one particular size of the collecting droplet there is a minimum size of collected droplet below which no collection is possible. This size decreases with increasing size of the larger droplet greater than 10μ in radius. For droplets smaller than 10μ in radius, collision can occur only between droplets of nearly equal size. The results could account for coalescence becoming an important factor in the rapid formation of rain-drops for droplets of radii greater than 10μ. *Subject Heading:* **1. Droplet coagulation.**—*Authors' abstract.*

8.4–262 551.574.2 :551.509.62

Warner, J. and Bigg, E. K. (both, *Div. of Radiophysics, C.S.I.R.O., Australia*), **Effects of air temperature and pressure on the decay of silver iodide.** *American Meteorological Society, Bulletin*, 37(3):94–95, March **1956.** 2 figs., 3 refs. **DWB**—Bolton and Qureshi's laboratory experiments on the decay of silver iodide smokes were repeated and it was shown that for dilute smokes the deterioration was very slight and there was no important temperature effect. It is concluded that the coagulation of concentrated smokes used was responsible for the high rates of decay they observed at warm temperatures. *Subject Heading:* **1. Silver iodide properties.**—*Authors' abstract.*

8.4–263 551.574.42

Shishkina, L. A., **Iskliuchitel'nyĭ gololed.** [Exceptional glaze.] *Priroda*, Moscow, 44(12):113–114, Dec. **1955.** 2 figs. **DLC**—An exceptionally heavy glaze observed in the region of Tuapse during 114 hours on Feb. 18–23, 1954, when the thickness of ice on wires and tree branches attained 5 cm, and the ground, houses and trees were covered with an ice crust which could be removed only with the aid of axes and hammers, is described in detail, with an analysis of synoptic conditions preceding the beginning and termination of the glaze. *Subject Headings:* **1. Glaze 2. Icing of wires 3. Tuapse, U.S.S.R.**—*A.M.P.*

8.4–264 551.574.7:629.13

Painting, W. B., **High-level icing.** *Meteorological Magazine*, London, 85(1013):346–347, Nov. 1956. table, 4 refs. **DWB**—Clear air icing of the front of the airplane canopy occurred at 40,000 ft over England on Dec. 6, 1955. Upper air temperatures are given; at 40,000 ft they were −61° to −66°C with a steep lapse rate. An editorial refers to electrification of the plexiglass canopy by friction with ice crystals in thin cirrus, which caused the ice to adhere to the canopy. *Subject Headings:* **1. Icing of aircraft 2. High level icing.**—*C.E.P.B.*

FOG

See: **Fog frequencies, Milan** (Moja), 8.4–101; **Fog particle analysis** (Serpolay), 8.4–123.

CLOUDS

See also: **Sunshine and cloudiness, Sweden, 1901–1930** (Lindholm), 8.4–95; **Cyclone frequencies, Mediterranean** (Dagnino), 8.4–196; **Climatic variations and past solar activity** (Link), 8.4–205.

8.4–265 551.576(675)

Dessens, H. and Xhaard, T., **Études sur les nuages équatoriaux, Pt. 2. Nuages de saison sèche à Lukolela.** [Studies on equatorial clouds, Pt. 2, Clouds of the dry season at Lukolela.] *Puy-de-Dôme. Observatoire, Bulletin*, Ser. 2, No. 2:47–54, April/June **1956.** 2 figs., table, 5 refs. French and English summaries p. 47. **DWB**—The dry season at Lukolela, Belgian Congo (1°5′S, 13°17′E) centers on July (31 mm rain). Clouds were studied by simultaneous photos from points 5.2 km apart. Types were plotted, heights and movements calculated. The numerous Cu are due to humidity of low air layers above marshes, and strong insolation. Evolution of cumuli is described. (Pt. 1, *see* 6J–358, Oct. 1955, *MAB*.) *Subject Headings:* **1. Cloud studies 2. Belgian Congo.**—*C.E.P.B.*

8.4–266 551.576.1:551.577.1

Harper, R. D. M., **Shower clouds over the Mersey.** *Weather*, 11(12):404, Dec. **1956. DWB**—Referring to M. H. O. Hoddinott (*Weather*, 11(8):260–261, Aug. 1956; *see* 7.11–246, Nov. 1956, *MAB*) further examples of cloud over the Mersey are described. They are attributed to channeling of the wind. *Subject Headings:* **1. Shower clouds 2. Liverpool, Eng.** —*C.E.P.B.*

8.4–267 551.576.1:629.135.2

Helliwell, N. C. and Mackenzie, J. K., **Further observation of condensation trails.** *Great Britain. Meteorological Research Committee, M.R.P.*, 979, June 27, **1956.** 6 p. 9 figs., 2 tables, 10 refs. Mimeo. **DWB**—Two methods of observing tops and bases of trails formed by a Canberra are described: by a second aircraft and by a camera in the tail operated by remote control. Temperature, height, airspeed and frost point were also measured. Observations during 1955 are tabulated and frost points of trail formation plotted against temperature and pressure. Plots of airplane ascents and photos of trails are given for 3 special cases. Plots also show length of trail against temperature difference from MINTRA and depression of frost point, effect of engine setting and effect of relative humidity on temperature at contrail base. It is concluded that temperature is the most important variable in contrail formation, relative humidity and engine setting only secondary factors. The length of the trail is a complex function of temperature and humidity. A forecasting procedure is suggested. *Subject Heading:* **1. Condensation trails.**—*C.E.P.B.*

8.4–268 551.576.11

Alexander, Rolf and Scorer, R. E., **The man who dissolved clouds: the biological aspect of meteorology.** *Weather*, 11(12):396–400, Dec. **1956.** 3 refs. **DWB**—Alexander supposes a "bio-physical field" in the atmosphere which propagates impulses from the human brain, impulses which can dissolve clouds. Successful experiments are referred to (but not documented), and a protest is made about Scorer's attitude (*Weather*, 11(10):319–322, Oct. 1956; *see* 8.2–221, Feb. 1957, *MAB*). In his reply Scorer questions Alexander's theory

and points out that he has produced no real evidence in support. *Subject Heading:* **1. Cloud dissolution.**—*C.E.P.B.*

PRECIPITATION

See also: **Radar precipitation echoes** (Battan, Braham), 8.4–84; **Intense rainfall, Nagpur** (Ananthakrishnan, Rajagopolan), 8.4–201; **Statistical study of monsoon precip.** (Sato), 8.4 228; **Evaporation and rainfall, Coimbatore** (Jayarama, Balasubramanian), 8.4–257; **Precip. mechanism in Cu clouds** (East), 8.4–259; **Shower clouds** (Harper), 8.4 266; **Border floods, Aug. 1956** (Common), 8.4–283; **Electric current during rain and snow** (Chalmers), 8.4–328.

8.4–269 551.577(669)

*British West Africa. Meteorological Services, **Preliminary note on the rainfall of Nigeria.** Its *Meteorological Notes*, No. 2, pub. [1956?]. 66 p. graphs, charts, tables. **DWB**—Isohyetal charts, histograms and other graphic representations of the rainfall in Nigeria, are included in this monograph along with supporting data for period of record (up to 1952) for >100 stations. About 500 new rainfall stations have been established in the past 5 years, but data for these stations are not yet of climatological interest. The annual and monthly values of rainfall and rainy days are presented on colored isohyetal charts. The range from 21″ a year at Nguru in the NE to 392″ at Debundscha to the extreme SE (on the SW slope of Cameroon Mt.) is indeed formidable. The monthly year to year and hourly variations are also extreme. Several stations average 60″ a month in the rainiest months. Intensities and secular variations are also discussed and shown graphically. *Subject Headings:* **1. Rainfall data 2. Isohyetal charts 3. Nigeria. I. Brown, B. M. II. Clackson, J. R.** (*Dir.*).—*M.R.*

8.4–270 551.577.2:551.509(547)

Hariharan, P. S. (*Met. Off., Bombay*), **The density of reporting network necessary for a proper appraisal of the occurrence of rainfall in selected localities in the Bombay and Hyderabad States.** *Indian Journal of Meteorology and Geophysics*, Delhi, 7(2):129–136, April 1956. 12 figs., 8 tables, 2 refs. **DWB, DLC**—A study of rainfall distribution in the neighborhood of 4 selected localities of Bombay and Hyderabad States during 1941–45, shows that estimates of rainfall within 50 mi of a main station fall far short of the actual state when based on one, or even on 10 stations. For example, in the Ahmedabad area with 25 stations in 650 mi radius, only 30% of the days in the monsoon period (June–Sept.) showed rain at Ahmedabad when 10 stations were used, whereas 63% showed rain if all 25 stations were used. In the Ahmednagar area, with 14 stations, the coverage increased from 21% to 56% if one or if all of the stations are used; in the Bijapur area, with 11 stations, the incidence increases from 17% of the days to 51% if all of the stations are used, and for the Nizamabad area with 22 stations the increase is from 40% to 80%. From the data and curves an estimate is made of the optimum number of stations in a 50 mi radius—in most cases about 25. *Subject Headings:* **1. Rain gage network efficiency 2. Monsoon rainfall 3. Bombay 4. Hyderabad.**—*M.R.*

8.4–271 551.577.3:551.513.2(68)

Rubin, Morton J., **The associated precipitation and circulation patterns over southern Africa.** *South Africa. Weather Bureau, Notos*, 5(1):53–59, 1956. 16 figs., 6 tables. **DWB**—An attempt is made to explain South African precipitation extremes in terms of circulation patterns. Homogeneous series of data for a rainfall network of 23 stations and a pressure network of 35 stations are used in this study. By dividing the data on the basis of two rainfall sectors, two seasons, and two precipitation extremes of monthly maximum and minimum precipitation quintiles, eight different patterns are determined. These are found to be related to eight distinctive pressure-departure patterns. The circulation anomalies which are associated with the precipitation extremes are of the proper character to explain them on a physical and synoptic basis. No close relationship is evident between the rainfall extremes and the various circulation indices based upon the maps of the Southern Hemisphere Analysis Project. A factor of climatological significance is that seasons of maximum precipitation are due as much to greater intensity of precipitation as to more days of rain. Conversely, seasons of minimum precipitation are due to rains of less than normal intensity as well as a lesser than

normal number of days of rain. *Subject Headings:* **1. Precipitation variations 2. Circulation patterns 3. South Africa.**—*Author's abstract.*

8.4–272 551.577.33:551.577.38(43)

Stuchlík, František, **O pořádkových zásadách v povětrnostním dění.** [Regularities in weather development.] *Meteorologické Zprávy*, Prague, 9(2):52 56, **1956.** 3 tables, 46 refs. Russian and German summaries p. 52–53. **DWB**—In a century's precipitation records for 5 stations in Czechoslovakia and 4 stations in Germany and Austria, a 6-year periodicity of dry summers is identified. The 6-year cycle is interpreted as a combination of the 1.2-year period of the earth's axial movement and the annual period of the earth's rotation. *Subject Headings:* **1. Drought periodicities 2. Europe.**—*G.T.*

8.4–273 551.577.37(468)

Hurst, G. W., **Prolonged heavy rain at Gibraltar, November 20–26, 1955.** *Meteorological Magazine*, London, 85(1013):324–330, Nov. **1956.** 2 figs., 4 tables. **DWB**—Rainfall during the week at 6 stations ranged from 15·21″, average 17.57″, much more than at any nearby station. Hourly figures show 5.93″ in 8 hours and 1.18″ in one hour. The synoptic situation shows persistent warm moist E winds along Western Mediterranean with some blocking west of the Straits, and an overrunning moist unstable SW current. The topography, especially the 1400 ft Rock, caused convergence and ascent over Gibraltar. *Subject Headings:* **1. Excessive rainfall 2. Gibraltar.**—*C.E.P.B.*

8.4–274 551.577.51

Sawyer, J. S., **The physical and dynamical problems of orographic rain.** *Weather*, 11(12): 375–381, Dec. **1956.** 4 figs., 3 refs., eq. **DWB**—The distribution of orographic rain on any day is considered from 3 aspects: 1) Dynamics of air motion over hills involves a disturbance of flow with a wave length of 50 km or so, with continuous ascent for about 30 min; 2) Microphysics may involve both sublimation of water on to ice crystals and growth by coalescence; this requires about 10 min and some rain would be carried beyond the watershed; 3) Synoptic requirements are a strong wind perpendicular to an extensive mountain ridge, an air mass moist in depth of nearly neutral stability, and a vertical wind profile with $\delta^2 v/\delta z^2$ positive. Examples of heavy (March 28, 1953, max >4″) and light (June 17, 1954, max 0.9″) orographic rain over Wales are analyzed. Calculated and observed values agree, and show that with heavy orographic rain most of the available water is precipitated, but with light rain only 30–50%. *Subject Heading:* **1. Orographic rainfall.**—*C.E.P.B.*

RAIN, SNOW AND HAIL

See also: **Radar echoes from snow** (Douglas et al.), 8.4–85; **Hail echoes on radar** (Harrison), 8.4–86; **Radar echoes from snow** (Hitschfeld, Dennis), 8.4 87; **Raindrop sampler** (Spencer, Blanchard), 8.4–119; **Wind roses on snow** (Nikolaev, Rauner), 8.4–229; **Collection efficiencies of small droplets** (Pearcey, Hill), 8.4–261.

8.4–275 551.578.46:551.588.6:551.579.2

Anderson, H. W., **Forest-cover effects on snowpack accumulation and melt, Central Sierra Snow Laboratory.** *American Geophysical Union, Transactions*, 37(3):307–312, June **1956.** 3 figs., 3 tables, 12 refs. **DWB, DLC**—Snowpack accumulation and melt at measurement points within snow courses were related to two forest-cover variables. Water equivalent of the snowpack on April 1 of each year and melt rate after April 1 per unit of degree-days above 35°F were studied. Cover variables were the amount of shade from trees to the south of a snow measurement point and the amount of shielding from trees to the north of the point. The amount of shade was expressed as the duration of shading between April 1 and June 15, multiplied by the amount of direct solar energy which would have struck the snow surface in the absence of shading. Shielding was expressed by the ratio of average tree height to distance of the trees from the measurement point. Data from five points in each of five snow courses for three years of record were analyzed by the method of covariance. The analyses showed a high degree of association between the snowpack and forest-cover variables. The results are

interpreted in terms of the timber-cutting pattern that would result in maximum accumulatio of snow, minimum melt rate, and maximum prolonged release of snow water in the sprin *Subject Headings:* **1. Forest snow pack 2. Snow melt runoff.** —*Author's abstract.*

8.4–276 551.578.7(44):629.13

§†Harrower, T. N. S. and Evans, D. C., **Damage to aircraft by heavy hail at high altitud** *Meteorological Magazine*, London, 85(1013):330–338, Nov. **1956.** 4 figs., 4 photos, 17 ref **DWB**—At 20,000 ft near Lyons on Aug. 14, 1954, an airplane met a severe thunderstorm wit forced ascent of 4000 ft in CuNb and very heavy hail. Photos show severe damage. Synopt chart, cross section and upper air ascents are given. Relevant literature is discussed. It suggested that frequency of hazardous thundery conditions is unusually great in the Rho Valley. *Subject Headings:* **1. Hail damage to aircraft 2. Rhone Valley.**—*C.E.P.B.*

8.4–277 551.578.7(5

Venkiteshwaran, S. P. and Ramakrishnan, S. S. (*Met. Off., Poona*), **Hailstorm at Poo on 16 March 1954.** *Indian Journal of Meteorology and Geophysics*, Delhi, 5(4):343–34 Oct. **1954.** figs. (incl. photos.), tables, 2 refs. **DLC**—An unusually imaginative analysis of severe hailstorm that was estimated to have consisted of about 2 trillion (2×10^{12}) stones whic fell over 24 square miles (6×4 mi) with maximum size about $\frac{1}{2}$ in. to $\frac{3}{4}$ in. from place to plac Crops and experimental vegetable gardens as well as mangoes were injured severely. Ni soil and radiation thermometers were broken. Aluminum sheets, 10 feet square, over thr plots had an average of 390 dents per square foot. Radar photos show vertical and horizont extent of storm and changes with time. Such changes agree fairly well with Byers' resul (1949) in the thunderstorm project. Highest echo was 35 thousand feet or 10.7 km at te perature of −40°C. Rainfall, wind, temperature, pressure and humidity records are r produced and discussed. *Subject Headings:* **1. Hailstorms 2. Hailstone size 3. Hailsto size distribution 4. Poona, India.**—*M.R.*

8.4–278 551.578.72(41

Rowsell, E. H., **Damaging hailstorms.** *Meteorological Magazine*, London, 85(1013):34 346, Nov. **1956.** fig., table. **DWB**—In 1906–55 hailstorms sufficiently severe to dama crops or glass-houses in Britain occurred on 169 days, ranging from 0 in Dec. to 44 in Jun The distribution is shown as number per 100 yr per 100 sq mi, and ranges from 0 in N. Scotla to 6.1 in the London area (probably exaggerated). *Subject Headings:* **1. Hailstorm distributi 2. Hail damage statistics.**—*C.E.P.B.*

8.4–279 551.578.73(788) 551.509.54:551.578

Beckwith, W. Boynton (*Weather Service, United Air Lines*), **Hail observations in t Denver Area.** *United Air Lines, Inc., Denver, Colo., Meteorology Circular*, No. 40, April 1, 195 41 p. 23 figs., 4 tables, 18 refs. Also abridged version: **Characteristics of Denver hailstorm** *American Meteorological Society, Bulletin*, 38(1, Pt. 1):20–30, Jan. **1957.** 18 figs., 3 tabl 18 refs. **DWB**—Continuation of a study of hail distribution, damage to aircraft and forecas ing in the higher Great Plains of eastern Colorado made by Henry T. Harrison and t author, and in 1950 from 1949 data (*see* D–190, April 1950 and 2.11–151, Nov. 1951, *MA* The data from a close network of hail reporting stations in the Denver area from 1949–19 are analyzed to show what modifications are necessary to the conclusions made in the abo cited paper, in the light of better data and more recent knowledge and techniques for foreca ing. Conclusions regarding geographical distribution, aircraft damage and synoptic patter for hail have not been altered, but some changes in ratio of area to point frequency, and in ti of occurrence have been suggested. Better analysis of individual hailstorms and bet synoptic-statistical tools for forecasting hail are presented. The hail-thunderstorm ra is shown to be 5 times that which would be obtained from the regular U. S. W. B. netwo and would likely be 1:1 if every local occurrence of hail could be detected. Many grap and charts show the network in the Denver area; an actual calendar of the days with lightni thunder and hail for April–Nov. 1949–55; the hail-thunder ratio for each year; the ha precipitation-ratio (amount of precipitation is a very good indicator of hail frequency); annu seasonal and diurnal frequency; duration of storms and size of hailstones; frequency of ma

mum hail size by months and by local areas within network; and isochrones of hail onset for a dozen individual storms (with a discussion of each storm). Forecasting hail from knowledge of orographic effects, synoptic patterns, upper wind flow, surface temperature, and dew point, and from Fawbush-Miller thermodynamic method is discussed. The last two methods do not give success in this area where dew points are usually low and condensation levels very high. *Subject Headings:* **1. Hail frequency studies 2. Hail forecasting 3. Denver, Colo. Area.** —*M.R.*

HYDROMETEOROLOGY

See also: **Forest-cover effects on snowpack** (Anderson), 8.4–275.

8.4–280 551.579:551.491

Bogoliubov, S. N. and Bogomazova, Z. P., **Vertikal'naia zonal'nost' podzemnykh vod kak osnovnoĭ faktor formirovaniia stoka.** [Vertical zonality of underground waters as the basic factor in the formation of runoff.] *Meteorologiia i Gidrologiia*, Leningrad, No. 6:19–25, Nov./Dec. **1955.** 5 figs., table, 7 refs., eq. **DWB, DLC**—The zonal classification of underground waters developed by B. L. Lishkov and F. A. Makarenko based on a vertical hydrodynamic zonality of underground waters due to the drainage bases of the flow, namely the sea level and erosional cutting, is employed to analyze the role of underground waters in the flow of large and small rivers. It was found that one of the principal factors influencing the amount of annual flow is the vertical hydrodynamic zonality of the underground waters and the extent to which underground waters are tapped by the eroded bed. The change in the underground supply of streams within the same physiographic zone or geologic province is expressed by S-shaped curves including the increase in annual stratum of flow with lowering of erosion bed of the stream. The variability of annual flow of streams shows an inverse curvilinear dependence on the marks of erosional channel cutting and is expressed by

$$\frac{Cv_{\Delta}}{Cv} = \left(\frac{h}{h_0}\right)^n$$

where index $n = 0.6$. *Subject Headings:* **1. Underground waters 2. River discharge.**—*I.L.D.*

8.4–281 551.579

László ffy, Woldemár, **A fajlagos lefolyás sokévi átlaga Magyarországon és a hidrológiai hossz-szelvények.** [Mean annual runoff in Hungary and hydrologic longitudinal sections.] *Vízügyi Közlemények*, Budapest, No. 2:147–156, **1954.** 3 figs., map (fold.), 2 tables, 19 refs., 3 eqs. French summary p. (27). **MH-BH**—A comparative table of runoff calculated for ten stations in Hungary according to different formulas (Keller, Coutagne, Budyko, Kuzin, Khosla and Langbein) is presented. Each of the formulas is explained and its applicability to Hungary discussed. A diagram is presented, showing average specific runoff as a function of average precipitation and corrected mean temperature according to Langbein. On the basis of this correlation a map of average specific runoff (1901–1940) is drawn for the Hungarian section of the Danube Basin. *Subject Headings:* **1. Runoff 2. Hungary.**—*G.T.*

8.4–282 551.579.2

Finlayson, H. M. (*Shawinigan Water and Power Co., Montreal*), **Snowmelt as a factor in Quebec stream-flow.** *Eastern Snow Conference, 9th, Springfield, Mass., 1952, Proceedings*, p. 25–45. figs. (colored) table. **DWB**—The St. Maurice watershed in central Quebec has an area of 16,000 sq mi or about that of New Hampshire and Vermont. Its flow of close to 75% of the mean runoff is one of the best regulated in the world. Statistics on dates of spring freshet, snow cover according to surveys in March, evaporative losses, precipitation during melting period and continuations of precipitation and snow melt are discussed and presented in tables and on color charts. The relation of the area to that of the entire province, both geographically and hydrologically, is also shown on charts. The heaviest floods sometimes occur when snow cover is limited and vice versa, owing to ground conditions and thawing effects of heavy spring rains, but as a rule snow cover is directly related to runoff. *Subject Headings:* **1. Snow melt runoff 2. Stream flow 3. St. Maurice watershed 4. Quebec, Canada.**—*M.R.*

8.4–283 551.579.4:551.577.37(411

Common, R., **The Border floods, August 1956: observations and comments.** *Scottis Geographical Magazine*, 72(3):160–162, Dec. **1956.** 3 photos, 6 refs. **DLC**—Flooding c valleys in the eastern Border counties of England and Scotland occurred on Aug. 28 followin peak rainfalls of up to 4″ in 24 hrs. Rivers rose by up to 16 ft and much damage was don (photos). Suggestions for remedy are made. The floods are compared with those of 194 *Subject Headings:* **1. Floods 2. Great Britain.**—*C.E.P.B.*

8.4–284 551.579.4:551.501.4

Eaton, T. D. (*Engr., State Elec. Commission, Victoria*), **The derivation and synthesi of the unit hydrograph when rainfall records are inadequate.** *Institution of Engineers (of Australia, Sydney, Journal*, 26(10/11):239–246, Oct./Nov. **1954.** 9 figs., 3 tables, 9 refs **DLC**—A method for constructing synthetic unit hydrographs for catchments lacking adequat rainfall records is presented, based on further development of CLARK's work in this fiel From an analysis of data for seven Tasmanian rivers, correlations between catchment character istics (area, length of channel and a branching factor) and unit hydrograph parameters (C an K as used by CLARK) have been obtained. *Subject Headings:* **1. Hydrographs 2. Runo evaluation.**—*Author's abstract.*

CLIMATOLOGY AND BIOCLIMATOLOGY

See: **Canadian met. literature** (Canada. Dept. of Mines and Technical Surveys), **8.4–51.**

CLIMATE OF PARTICULAR PLACES

See also: **Climate of Illinois** (Page), 8.4–26; **Climate of Nanga Parbat** (Flohn), 8.4–28; **Ishigaki-Shima and Miyako-Jima, met. data, Jan. 1952 Feb. 1955** (Japan. Central Met. Obs.), **8.4–99.**

8.4–285 551.582:523.78(213

Křivský, L. (*Astron. Inst., Ondrejov*), **Klima-Voraussage für die Zone der totalen Sonnen finsternis am 20.6.1955.** [Climatic forecast for the area of the total solar eclipse of June 2 1955.] *Bulletin of the Astronomical Institutes of Czechoslovakia*, Prague, 6(1):12–15, **1955** table. **DLC**—The region affected by the total eclipse of June 20, 1955 is a belt in the equatoria regions of the Indian Ocean, Southern Asia and the Pacific. A map showing likelihood o good weather for observation in various parts of that area is presented and commented on Ceylon and the coastal area of eastern Vietnam are suggested as having the best chance o fair weather. *Subject Headings:* **1. Climatic probabilities 2. Eclipse prospects 3. Tropics** —*G.T.*

8.4–286 551.582(45) 551.584.3

Polli, Silvio, **Clima, topoclima e microclima sul litorale di Grado.** [Climate, topoclimat and microclimate of the Grado littoral.] *Trieste. Istituto Sperimentale Talassografico Pubblicazioni*, No. 312, **1954.** 6 p. 9 refs. **DWB**—Notes on the local climatic peculiarities o this island resort area in the NW Gulf of Trieste (N. Adriatic). Marine and sandy beac influences are modified by a surrounding arc of mountains which protect the area from stron cold N winds. It also has a high percentage of clear days in summer. The surface of th sand reaches temperatures of 50° to 60°C and even 65°C (149°F) in June–Aug. Sea tem peratures in July average 26°C, air temperature in shade 27°C and in the sun just above th sand 55°C, and 20–30 cm above the same 30°C. *Subject Headings:* **1. Local climates 2. Beac microclimatology 3. Resort microclimatology 4. Grado, Italy.**—*M.R.*

8.4–287 551.582:63(47

Stavropol'skiĭ Kraĭ. Zemel'noe Upravlenie, **Prirodnye usloviia Severo-Kavkazskog Kraia i organizatsiia krest'ianskogo khoziaĭstva.** [Natural conditions of North-Caucasu Region and organization of the farmer's economy.] *Materialy k Perspektivnomu Plan Vosstanovleniia i Razvitiia Sel'skogo Khoziaĭstva Severo-Kavkazskogo Kraia*, (ed. by A. T Riazanov and M. A. Shaposhnikov.) Vol. 1, pub. Rostov-Don, **1925.** 2 pts. in 1 (77+268 p.

t. 1, Viazovskiĭ, P. L.; Zakharov, S. A. and Novopokrovskiĭ, I. V., **Prirodnye Usloviia Severo-avkazskogo Kraia.** Pt. 2, Razdaev, P. N., **Osnovnye cherty organizatsii krest'ianskogo ıoziaĭstva na Severnom Kavkaze.** [Basic characteristics of the organization of farmer's conomy.] **DLC**—On p. 7–24 a general outline of the climate is given. Three factors are onsidered important in distribution of heat and moisture over the region: 1) surface relief, pressure topography, 3) atmospheric centers of action. Wind, temperature, precipitation nd humidity means are given in tables and some unfavorable phenomena like storms, droughts, tc. are discussed. Four regions are discerned according to moisture conditions: 1) extremely ry zone 2) arid zone 3) zone of insecure moisture 4) moist zone. *Subject Headings:* **1. Climate f North Caucasus 2. Agricultural climatology 3. Russia.**—*N. A. Zikeev.*

8.4–288 551.582(51)

*Yuan, M. Y., **Climate [of the Peipei Region].** *Geography*, Nanking, China, 5(3/4), ec. **1945,** printed Sept. 1948. 9 p. tables. (Special issue on Peipei.) In Japanese. **WB**—Contains a number of illustrative tables of data for mean monthly or seasonal pressure, mperature, relative humidity, precipitation, wind direction and speed, etc. for Peipei (NW Chunking in Szechwan Province of China). Data for 1935–44 are included in analytical ıbles for Peipei, and data for varying lengths of record (for comparative purposes) for other ations in China (precipitation, relative humidity, wind, temperature etc.). Analysis, all Chinese, accompanies the tables. *Subject Headings:* **1. Climate of Peipei, NW Szechwan rovince, West China 2. Climatic data 3. Peipei, Szechwan Province, China.**—*M.R.*

8.4–289 551.582.1:58(6)

Sillans, Roger, **L'uniformité des cadres géographiques oubanguiens et sa répercussion ır la végétation.** [Uniformity of the geography of Ubangi scene and its effect on vegetation.] *cadémie des Sciences, Paris, Comptes Rendus*, 240(12):1360–1362, March 21, **1955.** 6 refs. **WB**—The effect of the uniformity of the three main factors influencing the development nd distribution of vegetation on the territory of the Province in Central Africa is discussed. is shown that the monotony of its relief—a slightly undulating peneplain with altitudes arying between 650 and 850 m; the uniformity of seasonal and annual precipitation amounts etween 1520 and 1213 in the rainy and 229 and 137 in the dry seasons) and the evenness of ean temperature distribution (between 25° and 27°C in both the rainy and dry seasons) are eflected in the uniformity of the vegetation species on the whole extent of the province. The elief uniformity is expressed by the very small number of orophile and sub-orophilic species ocalized in the northwest, the uniformity of temperature and precipitation distribution is ndicated by the small number of xerophilous species which are confined to the northern egions adjoining Tchad. Some small localized areas with ombrophilous tree species in river asins and plateau borders of the south are mentioned. *Subject Headings:* **1. Climatic normals . Climatic effects 3. Vegetation 4. Climate of Ubangi Province 5. Ubangi Province, entral Africa.**—*A.M.P.*

8.4–290 551.582.2(669)

*British West Africa. Meteorological Services, **The climate of Nigeria in February.** Its *leteorological Note*, No. 3, [**1955**]. 18 p. figs., tables. **DWB**—This pamphlet gives data n the most significant meteorological elements for the Royal Tour Jan. 28–Feb. 16, 1956. eb. average and extreme temperature, relative humidity, rainfall, sunshine, visibility, wind oses and mean diurnal variations in these elements, etc. for Lagos, Calabar, Ibadan, Jos, Kano, Kaduna, Enugu and Port Harcourt, Nigeria. Text discusses regional variations riefly. Data are presented in tabular and graphic form. *Subject Headings:* **1. Climate of Nigeria 2. Climatic data 3. Nigeria.**—*M.R.*

8.4–291 551.582.2(661)

*Font Tullot, Inocencio, **El clima del Sahara, con especial referencia a la Zone Espãnola.** Climate of the Sahara, with special reference to the Spanish Zone.] Madrid, Consejo uperior de Investigaciones Cientificas, **1955.** 112 p. 33 figs., tables, 11 refs. At head of -p: Instituto de Estudios Africanos.—This comprehensive monograph on the climate of the panish zone of the Sahara desert consists of three parts. Pt. 1 contains a description of the

physical geography of the Sahara and of the overall climate including a general survey of the individual meteorological variables, air masses, cyclonic disturbances, etc. In Pt. 2 a detailed description of the climate of the Spanish zone is presented. This includes an account of the wind regime and oceanic currents of the Canaries as factors influencing the climate of the Atlantic coast of the Sahara, of the individual meteorological variables, and of weather types. In Pt. 3 the author discusses the water problems in the Sahara, climate and agriculture, the salubrity of the climate, wind and solar energy in the Sahara, and the encroachment of the desert as a result of human actions. Data are presented in graphs and isolines and climatological summaries are given in tables for Villa Bens, Villa Eisneros and Smara. *Subject Headings:* **1. Climate of the Sahara Desert 2. Physical geography 3. Climatic data 4. Sahara Desert (Spanish Zone).**—*I.L.D.*

8.4–292 551.582.2(75/6)

*Hocker, Harold W., Jr., **Climatological summaries for selected stations in and near the southern pine region, 1921–1950.** *U. S. Forest Service. Southeastern Forest Experiment Station, Station Paper*, No. 56, Aug. **1955.** unpaged. almost entirely tables. **DWB**—Average monthly and annual data for period 1921–1950 for 83 first order Weather Bureau and 124 Cooperative observing stations in the Southeastern States (Oklahoma to S. New Jersey and East Texas to Florida, including Missouri, Kentucky, West Virginia and East Pennsylvania) are presented in fine print machine tabulation style form, for average, mean, maximum and minimum temperature; average total, number of days ≥ 0.01 and ≥ 0.50 in. of precipitation, together with frost (average, last spring and first autumn) and growing season data. Stations are arranged alphabetically by States. *Subject Headings:* **1. Climatic data for Southeastern States 2. Southeastern United States.**—*M.R.*

CLIMATIC CHANGES

See also: **Wind-oriented lakes and eolian deposits** (Schenk), 8.4–238; **Secular climatic changes and sunspots** (Nordö), 8.4–318.

8.4–293 551.583.2:551.311.12

Muntz, Alfred Philip, **Recent glacier activity in the Taku Inlet area, Southeastern Alaska.** *Arctic*, Ottawa, 8(2):83–95, **1955.** 6 photos, 5 refs. **DLC**—All of the glaciers in the Juneau region, except Taku Glacier, of Alaska have been retreating. These glaciers reached a maximum during middle of 18th century starting to retreat about 1765 according to LAWRENCE (1950). The writer checked these glaciers and came to essentially the same conclusion. Trimlines or discontinuities between age of timber untouched by the glacier and timber reestablished after the glacier retreated, were used to determine the time the glaciers were absent. Tree ring counts from cores taken on the edges of Norris and Taku glaciers show that the Norris glacier reached a maximum about 1910 that was greater than any since 1200 A.D.; but that the Taku has only just reached its maximum extent in the past 300 years or so. *Subject Headings:* **1. Glacier retreat 2. Dendrochronology 3. Taku Inlet glaciers 4. Southeast Alaska.**—*M.R.*

8.4–294 551.583.3:061.2(436)

Büdel, Julius, **Neue Eiszeitforschung in Österreich.** [New Ice Age investigation in Austria.] *Erdkunde*, 10(4):309–313, Dec. **1956.** 2 tables. **DWB**—This is a report of the meeting of the German Quaternary Union in Sept. 1955 in Austria. A number of papers on the moraines and glacial succession of the Alps are summarized, including recent radiocarbon dating of Late Glacial stages by H. SCHWABEDISSEN. Several papers dealt with the regional climatic conditions of the loess and river terraces. *Subject Headings:* **1. Ice Ages 2. Conferences 3. Austria.**—*C.E.P.B.*

8.4–295 551.583.3:581.16(411)

Durno, S. E., **Pollen analysis of peat deposits in Scotland.** *Scottish Geographical Magazine*, 72(3):177–187, Dec. **1956.** 3 figs., plate, table, 12 refs. **DLC**—Recent pollen analyses from 5 sites are described and illustrated. Zones V–VIII of W. Europe (Boreal onward) are present.

The history of individual tree species and non-arboreal plants is described. *Subject Headings:* **1. Pollen analysis 2. Scotland.**—*C.E.P.B.*

8.4–296 551.583.3:551.311.14(434)

Heybrock, Werner, **Die Eiszeit im Nordschwarzwald.** [The Ice Age in the northern Black Forest.] *Naturwissenschaftliche Rundschau*, 9(12):474–476, Dec. **1956.** 2 figs. **DWB**—Riss and Würm moraines from a local glaciation are described and illustrated. A moraine of large blocks is probably Mindel. *Subject Headings:* **1. Glacial period moraines 2. Black Forest, Germany.**—*C.E.P.B.*

8.4–297 551.583.3

Mölder, Karl, **Siperian kvartäärikautinen mannerjäätikkö ja postglasiaalinen ilmasto.** [Quaternary land ice and post glacial climate in Siberia.] *Terra*, Helsinki, 67(4):111–122, **1955.** 4 figs. **DWB, DLC**—Geologic investigations in Siberia have revealed that the quaternary glaciation covered only the Northwestern region of Siberia and covered an area of 4 mill km² extending from the European land ice margin to the Taimyr Peninsula. The thickness amounted to only about 700 m or about ⅛ of the European land ice. After the melting of the Siberian land ice, the climate became milder and the northern forest boundary extended to the islands in the Arctic Ocean. Opinions differ on the land ice in central and eastern Siberia during the quaternary, some investigators believing that it covered all of Siberia while others thought no land ice was present in central and eastern Siberia. *Subject Headings:* **1. Quaternary climates 2. Glaciation 3. Siberia.**—*I.L.D.*

8.4–298 551.583.3:529:551.7

†Pittioni, Richard, **Zur Chronologie des Lithikums.** [On the chronology of the Stone Age.] *Forschungen und Fortschritte*, 30(12):370–378, Dec. **1956.** 4 tables, numerous refs. **DLC**—This paper includes detailed geochronological tables, fully documented, giving the glacial and pluvial, and postglacial climatic and archeological successions in Europe, Mediterranean, Africa, Asia and America in the whole period since 600,000 B.P., the Würm glacial period and postglacial. The Ice Age chronology follows ZEUNER. *Subject Headings:* **1. Geochronology 2. Quaternary climates.**—*C.E.P.B.*

8.4–299 551.583.3:529

*Shostakovich, V. B., **Dovye otlozheniia Sakskogo ozera kak letopisi klimata.** [Varves of Saki Lake as climatic chronology.] (In: **Saki-Kurort.** Simferopol, Gos. Izdat. Krym ASSR, **1935**. Vol. 1, p. 255–272. 4 figs., tables.) **DLC**—Shows results of measurements of layers of silt from 3470 B.C. to 1800 A.D. Comparison is made with similar data for 6 other lakes and 3 seas and the periodicity shown to agree with the 11-year sunspot cycle. Weather phenomena of all types and for many places are correlated with these data and shown to agree fairly well. *Subject Headings:* **1. Varves 2. Solar-terrestrial relationships 3. Climatic changes 4. Saki Lake, Crimea.**—*M.R.*

8.4–300 551.583.3(411)

†Synge, F. M., **The glaciation of north-east Scotland.** *Scottish Geographical Magazine*, 72(3):129–143, Dec. **1956.** 5 figs., 49 refs. **DLC**—The history of glacial investigation in this region in 1906–56 is set out. A sequence of 4 glaciations is described and interpreted as follows: Riss, Scandinavian ice in E. Aberdeen followed by expansion of Scottish ice during Greater Highland glaciation; Interglacial with active chemical weathering; Würm, Scottish ice fanned out from Firths of Tay and Forth; Interstadial; Advance of Grampian ice (Aberdeen or Perth readvance); Interstadial; Dinnet readvance of Dee glacier; Final decay of valley glaciers. *Subject Headings:* **1. Glacial periods 2. Scotland.**—*C.E.P.B.*

8.4–301 551.583.7:581.9(98)

Platt, Rutherford, **Flowers in the Arctic.** *Scientific American*, N. Y., 194(2):88–98, Feb. **1956.** 14 photos, map. **DLC**—On 1947 and 1954 MacMillan Expeditions to Kane Basin near the northern tip of Greenland, the author discovered numerous plants and flowers in places so sterile and ice covered that plant life appeared impossible. Remarkable adaptation

to cold, ice, wind and drought was evidenced. The same species were found here at sea level as are found at very high altitudes in the Himalayas and other high mountains of temperate latitudes. Fossil remains of Arctic hardwood forests were found in upper Cretaceous Sandstone (75 million years old). Some of the leaves or twigs were just like those of Sycamore, Elm, Sassafras and redbud-leaf trees growing today in New England or Japan. *Subject Headings:* **1. Arctic vegetation limits 2. Paleoclimatology.**—*M.R.*

MICROCLIMATOLOGY

See also: **Micromet. research, Pt. 1** (Lettau), 8.4–92; **Micromet. research, Pt. 2** (Lettau), 8.4–93; **Thermal radiation in hot workrooms** (Predmerszky), 8.4–109; **Diurnal air temp. variations, Japan** (Yoshino, Fusuki), 8.4–211; **Climate, topoclimate, microclimate, Grado** (Polli), 8.4–286.

8.4–302 551.584:6

Miller, David H. (*Quartermaster Corps, Res. and Development Center, Natick, Mass.*), **Landscape and climate: The need for interdisciplinary research in physical climatology and physical geography.** Given at 143d national meeting, American Meteorological Society, New York, Jan. 26, **1956.** 7 p. 2 figs. Mimeo.—A brief discussion of climatic elements such as solar radiation, albedo, air temperature, wind, etc. and resulting radiation melt and snow runoff which are best studied quantitatively with a view toward understanding the physical processes involved, if applications of climatic data to specific engineering or agricultural problems are to be made. Terrain, landscape, cover, etc. also must be considered as they are intimately related to the microclimate. Illustrations show how data on climate and terrain were applied to a hydrological problem in Central Sierras. *Subject Headings:* **1. Microclimatological research 2. Applied climatology 3. Central Sierras, Calif.**—*M.R.*

8.4–303 551.584.31:551.585.53(235.243)

Schweinfurth, Ulrich, **Über klimatische Trockentäler im Himalaya.** [On climatically dry valleys in the Himalayas.] *Erdkunde*, 10(4):297–302, Dec. **1956.** 2 figs., 33 refs. English summary p. 297–298. **DWB** Climatically dry valleys are found throughout the Himalayas (map and vertical section), even in the humid eastern part. They often occur beneath cloud banks which maintain damp forests on the sides of the valleys. This phenomenon is typical of high mountain regions; it is explained by a local system of slope winds, descending in the middle of the valley and rising along the sides. *Subject Headings:* **1. Valley climatology 2. Drought areas 3. Himalayas.**—*C.E.P.B.*

8.4–304 551.584.9:646.4

Sissenwine, Norman, **Ventilation measurements inside clothing.** *U. S. Quartermaster Corps. Research and Development Branch. Environmental Protection Section, Special Report*, No. 14, March 24, **1949.** 14 figs., tables. **DWB, DLC**—The Ventimeter, a tiny, heated-thermopile nondirectional wind speed indicator, was used in preliminary experiments to determine its effectiveness in quantitative evaluation of ventilation between clothing layers. This instrument, developed by the Environmental Protection Section especially for this and other applied micrometeorological studies, showed great potentialities. Results of these preliminary experiments, in which an attempt was made to determine the best design of string vests, were not conclusive because the instrument was shaken out of calibration while in use. Modifications to eliminate this difficulty are under way. *Subject Headings:* **1. Ventimeters 2. Clothing climate 3. Ventilation measurement in clothing.**—*Author's abstract.*

CLIMATIC CLASSIFICATION

See also: **Future of arid lands** (White), 8.4–5; **Climatic humidity factors** (Zhegnevskaia), 8.4–253; **Dry valleys Himalayas** (Schweinfurth), 8.4–303.

8.4–305 551.585

Clausse, R. and Guerout, A., **La durée des précipitations: indice climatique ou élément de climatologie touristique.** [Duration of precipitation: a climatic index or element of tourist

climatology.] *La Météorologie*, Paris, Ser. 4, No. 37:2–9, Jan./March **1955.** 4 figs., 2 tables, 7 refs., eq. English and Italian summaries p. 2. **DWB**—In view of the importance of tourism in France and the fact that the usual criteria for defining the weather—amount of precipitation and number of rainy days—do not give an unequivocal picture of the weather to tourists, the author introduces a new climatic index which emphasizes the three factors which are of particular interest to tourists—the duration of precipitation and insolation and the mean air temperature. *Subject Headings:* **1. Tourist climatology 2. Climatic indexes 3. France.**—*A.M.P.*

8.4–306 551.585.7(436)

Steinhauser, F., **Klimatabelle für den Sonnblick (3106 m) 1901–1950.** [Climatic table for Sonnblick (3106 m), 1901–1950.] *Sonnblick-Verein, Vienna, Jahresbericht*, 49/50: 56–60, 1951–1952, pub. **1954.** tables. **DLC**—Mean monthly and annual averages, maximum and minimum averages, absolute maxima and minima, variances, etc., of pressure, temperature (including daily values), humidity, cloudiness, sunshine, precipitation and wind are tabulated for Sonnblick for the period 1901–1950, with comments on some of the differences between these values and those for the periods 1887–1936 and 1901–1930. *Subject Headings:* **1. Mountain climatology 2. Sonnblick, Austria.**—*G.T.*

8.4–307 551.585.7:551.311.2

Tanner, William F., **Parallel slope retreat in humid climate.** *American Geophysical Union, Transactions*, 37(5):605–607, Oct. **1956.** 2 figs., 4 tables, 7 refs. **DWB, DLC**—Three different statistical tests are applied to slopes on relatively uniform lithologies in northern Alabama. The tests applied are: Student's t, the correlation coefficient r, and analysis of variance. One hundred forty-five slope measurements were available for study. The following conclusions are drawn for the study area: 1) streams in V-shaped valleys are flanked by convex-upward slopes; 2) slopes above pediments, valley strips, or floodplains are lower than the slopes above actively downcutting streams; and 3) slopes above pediments, valley strips, or floodplains retreat at essentially constant angles. All three statistical tests yield the same results. *Subject Headings:* **1. Slope erosion 2. Climatic effects on topography 3. Northern Alabama.**—*Author's abstract.*

8.4–308 551.585.7:581.5(237.2)

Whittaker, R. H. (*Brooklyn College, N. Y.*), **Vegetation of the Great Smoky Mountains.** *Ecological Monographs*, Durham, North Carolina, 26(1):1–80, Jan. **1956.** 21 figs., charts, 8 tables, bibliog. p. 63–69. **DLC**—On p. 4 of this extensive monograph, the climatic conditions of the Great Smoky Mountain Range are summarized in terms of temperature, precipitation, cloudiness, thunderstorms and haze. The climate on the higher peaks is equivalent to that about 1000 miles farther north. Effect of climate on vegetation is considered throughout the monograph. *Subject Headings:* **1. Ecoclimatology 2. Mountain climatology 3. Great Smoky Mountains, N. C.**—*M.R.*

BIOCLIMATOLOGY

See also: **Environmental respiratory disease** (Huber, et al.), 8.4–78.

8.4–309 551.586:061

†Lossnitzer, H., **Bioklimainstitut und Observatorium Freiburg, 1946–1955.** [Bioclimatic Institute and Observatory in Freiburg, 1946–1955.] Freiburg Univ., Lehrauftrag für Meteorologie, **1955.** 18 p. bibliog. p. 11–18. **DWB**—The foundation of the Bioclimatic Institute at Freiburg in the French Occupation Zone in 1946 and under the Badischer Landeswetterdienst in 1952 is outlined, and the general duties of the Institute, the work in agricultural and forest meteorology, in health resort climatology and biometeorology, in physical meteorology (sun and sky radiation, O_3, CO_2, water vapor, pollution, etc.) and in microclimatology at elevations from 200 to 1500 m above sea level, in forest and open country and where precipitation ranges from 24″ to 80″ a year are described. Six conventions held at the Institute in the field of agro-, forest-, and biometeorology, publications (regular and irregular) and a long roughly classified bibliography of works by staff are listed. *Subject Headings:*

1. Bioclimatic Institute and Observatory 2. Bioclimatological institutes 3. Bibliographies 3. Freiburg, Germany.

8.4–310 551.586:536.41:546.212

Lavergne, Michel and Drost-Hansen, Walter, **Discontinuities in slope of the temperature dependence of the thermal expansion of water.** *Naturwissenschaften*, 43(22):511–512, Nov. 15, 1956. 2 tables, 6 refs. Also: Drost-Hansen, Walter, **Temperature anomalies and biological temperature optima in the process of evolution.** *Ibid.*, p. 512, 2 refs. **DWB**—Observations by P. Chappuis of thermal expansion of water between 0° and 41°C are analyzed statistically and showed discontinuities of slope near 15° and 30°C. The second paper states that discontinuities at 15°, 30°, 45° and 60°C are attributed to thermal degradation of polymers of type $(H_2O)_n$. Near 15°C many biological activities show a change. Optimum physiological temperature for mammals is about 37°C, i.e. midway between 30 and 45°C; no mammal can withstand 45°C for long. Soil bacteria have an optimum at 22°-23°C, thermophilic bacteria at 52°–55°C. Pasteurization temperature is 62°C. *Subject Headings:* **1. Thermal expansion of water 2. Bioclimatology 3. Temperature effects.**—*C.E.P.B.*

8.4–311 551.586:612.014.43

Edholm, O. G., **Physiological effects of cold environments on man.** (In: Institute of Biology, London, **Biology of deserts.** London, **1954.** p. 207–212. 8 refs.) **DWB**—The physiological adjustments of the human body to cold temperatures are briefly reviewed and a detailed summary is given of the study on the physiological adaptation to cold of the Eskimo carried out on Southampton Island, north of Hudson's Bay by Queen's University, Kingston, Ontario. Indications of increased basal metabolic rate, higher average blood flow at water temperature of 10°C, of improved tolerance to cold, of diminution in finger numbness, etc. The matter of diet and the thickness of the subcutaneous layer of fat as insulation against cold are discussed. *Subject Headings:* **1. Cold effects on man 2. Acclimitization 3. Southampton Island, Canadian Arctic.**—*I.L.D.*

8.4–312 551.586:612.5:551.521.2

Malysheva, A. E., **Primenenie radiatsionnogo okhlazhdeniia dlia profilaktiki peregrevaniia.** [Use of radiational cooling in the prevention of overheating.] *Gigiena i Sanitariia*, Moscow, 21(2):37–43, Feb. **1956.** 4 tables. **DLC** -In order to determine the effectiveness of radiation cooling from the body surface at high air temperature and radiation from heated walls two series of experiments were carried out on subjects at rest or engaged in physical work in a climatic chamber having a volume of 5.3m³ with six walls each of which could be either heated or cooled from −5° to +50°C. Evaporational water temperature, skin temperatures, gas exchange, etc. were measured for various combinations of air and wall temperatures. Data are presented in tables. Considerable effectiveness of radiation cooling is established. *Subject Headings:* **1. Cooling power 2. Radiational cooling.**—*I.L.D.*

8.4–313 551.586:634

Engelbrecht, Howard Herman (*U. S. W. B., San Francisco*), **Climatology and ecology of the Pacific Coast.** To be presented at the 31st National Shade Tree Conference, Santa Barbara, Calif., July 31–Aug. 5, 1955. San Francisco, Weather Bureau Office, July 5, **1955.** 24 p. **DWB**—A fairly complete discussion of many features of the climate of the Pacific Coast states (Wash., Ore. and Calif.) which have bearing on arboriculture. The records available, methods of processing by the U. S. W. B., climatic controls, precipitation, snow, atmospheric circulation, cyclones, anticyclones, growing season, temperature extremes, winds, gales, dry winds (easterlies), humidities, drought, thunderstorms, forest fires, grasslands, shrub, forests, evapotranspiration, etc. Some interesting statistics are quoted but no tabular data presented. *Subject Headings:* **1. Climate of Pacific Coast States 2. Ecoclimatology 3. Arboriculture 4. Western Pacific States.**—*M.R.*

8.4–314 551.586:646

Kelley, James B., **Heat, cold and clothing.** *Scientific American*, N. Y., 194(2):109-116, Feb. **1956.** 5 illustrations. **DLC** -A popular discussion, based on experience of Eskimos, the

U. S. Army Quartermaster Corps and others in clothing research. The effects of metabolism, insulating effects of various layers of clothes, protection against heat, dryness, humidity, insects and sun in the tropics or desert, and other aspects of clothing climate are discussed. The fact that addition of too many layers of clothing may cause a reversal of the insulating effect desired, owing to creation of too large an area compared to volume, is stressed. *Subject Heading:* **1. Clothing climate.**—*M.R.*

UPPER AIR CLIMATOLOGY

8.4–315 551.587:551.510.53(98)

*§†Warnecke, Günter, **Ein Beitrag zur Aerologie der arktischen Stratosphäre.** [Contribution to the aerology of the Arctic stratosphere.] *Berlin. Freie Universität. Institut für Meteorologie und Geophysik Meteorologische Abhandlungen*, 3(3), **1956.** 60 p. 32 figs., 3 tables, 38 refs. **DWB**—The average condition of the polar stratosphere is derived from various sources (Expeditions, Scherha, etc) and the fact that the winters of 1951/2, 1952/3 and 1953/4 were significantly abnormal as shown by radiosonde data from Alert, Ellesmere Island (82° 30′N, 62°20′W), for those years. The synoptic-dynamic conditions responsible for these abnormalities are shown by means of a number of 100 and even 50-mb charts, trajectories of cold centers or "Poles" for Jan. 1952, comparison of pressure regime at Alert and Irkutsk on Feb. 1–12, 1952 (inverse relationship), comparison of stratosphere temperatures at different levels from day to day, etc. It was found that the stratospheric heating and associated anticyclogenesis in Canada in that period (Feb. 1–12) could not be explained owing to missing data, but that it did have a connection with warming over Germany in late Jan. *Subject Headings:* **1. Stratospheric warming, Feb. 1952 2. Arctic stratosphere 3. Arctic aerology 4. Alert, Canadian Arctic.**—*M.R.*

8.4–316 551.589

*Puppo, Agostino, **Contributo alla climatologia della libera atmosfera di Venezia.** [Contribution to climatology of the free atmosphere over Venice.] *Rivista di Meteorologia Aeronautica*, Rome, 14(2):3–16, April/June **1954.** 4 figs., 5 tables, eqs. French, English and German summaries p. 3. **DLC**—Upper air pressure, temperature, humidity, vapor pressure, specific humidity, density, lapse rate of temperature and height of zero isotherm at Venice are calculated for levels up to 5000 m according to 4 types of air masses (A, G_AK, G_tW and T) and values presented in tables for each month. Isopleth charts show mean temperature, relative humidity, lapse rate and height of 0°C isotherm for each air mass for each month. Finally, the mean monthly surface pressure is tabulated for each air mass. The data are based on 917 airplane soundings made at the Lido di Venezia from 1937–1942. *Subject Headings:* **1. Upper air climatology 2. Venice, Italy.**—*M.R.*

ENVIRONMENTAL INFLUENCES

See: **Air flow patterns near buildings** (Moses), 8.4–154; **Air temp. and elevation** (Picko), 8.4–212; **Thermal conditions in mountains** (Stružka), 8.4–213; **Forest-cover effects on snowpack** (Anderson), 8.4–275.

MISCELLANEOUS

COSMIC INFLUENCES

See also: **Meteoric dust** (Hodge), 8.4–152; **Height variation of upper atmos. winds** (Greenhow, Neufeld), 8.4–245; **Meteoric forward-scattering** (Hines, Pugh), 8.4–340.

8.4–317 551.590.21 522.1

Evans, John W. (*Upper Air Res. Obs., Sunspot, N. Mex.*), **Solar influence on the earth.** *Smithsonian Institution, Wash., D. C., Annual Report, 1954*, pub. **1955.** p. 189–200. **DWB, DLC**—The author has given a broad general coverage of the entire field of solar-terrestrial-

ionospheric-magnetic relationships in this James Arthur lecture given under the auspices of the Smithsonian Institution on May 27, 1954. Models and effects are described and illustrated by homely and sometimes humorous analogies. The different kinds of radiation reaching the earth from the quiet and disturbed sun are emphasized and their effects on ionosphere-atmosphere and radio touched upon. The purpose of the new Air Force Cambridge Research Center Observatory at Sunspot, N. Mex., on Sacramento Peak at 9000 ft is stated to be merely to learn more about the sun. *Subject Headings:* **1. Solar influences 2. Astronomical observatories 3. Sunspot, New Mex.**—*M.R.*

8.4–318 551.590.21:551.583.14

†Nordö, Jack. **A comparison of secular changes in terrestrial climate and sunspot activity.** *Norske Videnskaps-Akademie i Oslo. Institutt for Vaer- og Klimaforskning. Report*, No. 5, 1955. 14 p. 12 figs., 3 tables, 15 refs. **DWB** Sunspots always occur in faculae or regions of increase in strength of convection, and are thought to be hydromagnetic eddies in a convective layer with high electrical conductivity, similar as illustrated from R. Simpson's model of a tropical cyclone to a hurricane vortex but with magnetic forces of primary importance. Evidence of climatic changes is correlated with sunspot activity for past 200 years: cold and warm winters in Central Europe and Stockholm, showing no appreciable variation in warm winters but high frequency of cold winters 1796–1885 during first low sunspot period, and low frequency of cold winters in recent period 1876–1915 of sunspot minima. Extrapolating the coming period of weak solar activity should coincide with an increase in cold winters. *Subject Headings:* **1. Solar-climatic relationships 2. Cold winters 3. Sunspot effects 4. Long period records 5. Europe 6. Stockholm, Sweden.**—*M.R.*

8.4–319 551.590.25:533.15

†Weiss, A. A. *Physics Dept., Adelaide Univ.*, **Diffusion coefficients from the rate of decay of meteor trails.** *Australian Journal of Physics*, Melbourne, 8, 2 :279–288, June 1955. 6 figs, table, 15 refs., 5 eqs. **DWB, DLC** —The effective diffusion coefficient for a meteor trail is calculated from the theory of ambipolar diffusion and the physical constants of the upper atmosphere. The absolute value of the diffusion coefficient so calculated, and also its gradient with height, are confirmed by measurement of the rates of decay of a large number of meteor echoes of known heights. The individual values show considerable scatter, most of which is attributed to a regular diurnal variation in the value of the diffusion coefficient. Amplitude fluctuations in persistent echoes are also briefly discussed. *Subject Headings:* **1. Diffusion coefficient for meteor trails 2. Meteor trail decay.**—*Author's abstract.*

VISIBILITY

See: **Visibility of airport runways** (Barr), 8.4–60; **Fogs at Milan, 120 yrs. observation** (Moja), 8.4–101.

OPTICAL PHENOMENA

See also: **Visibility aspect of air pollution** (Peterson), 8.4–156; **Luminous discharges in thunderclouds** (Malan), 8.4–332.

8.4–320 551.593.53:77

Volz, Friedrich (*Mainz, Univ., Inst. of Met. and Geophys.*), **Die Farbenphotographie in der atmosphärischen Optik.** [Color photography in atmospheric optics.] Reprint from: *Photographie und Wissenschaft*, 3, 1 1954. 12 p. 3 tables, 9 figs, some photos in color), 2 refs. **DWB**—This study is concerned with the problems of photographing in color the daylight sky and the colored shadows which appear at low solar elevations. The author discusses the sky color and the various types of dust-scattered light and describes the procedure for photographing these phenomena. Color photographs and descriptions are given of the sky color associated with cold air type, cloud type, and Bishop's ring type, and a comparison is made between the sky photographs and the theoretically tabulated sky light. A detailed analysis is given of solar double shadow and a photograph of the phenomenon is given and the

method of photographing is described. *Subject Headings:* **1. Sky light color photography 2. Color photography.**—*I.L.D.*

8.4–321 551.593.55:546.33

Donahue, T. M., **The Rayleigh scattering correction in measurements of the sodium twilight flash.** *Journal of Atmospheric and Terrestrial Physics*, 9 5 6 :262–268, Nov. **1956.** 3 figs., table, 3 refs., 19 eqs. **DWB**—It is pointed out that sunlight at the wavelength of the D lines is attenuated by passage through the sodium layer before it is scattered by the lower atmosphere in twilight. Thus the use of the scattered intensity at another wavelength to correct for Rayleigh scattering will lead to an overcompensation. This effect increases for decreasing angles for solar depression and may lead to negative values for the twilight flash intensity. Calculations are presented for a standard detector and for a resonance detector consisting of a sodium vapour cell and a photomultiplier tube. *Subject Headings:* **1. Sodium emission 2. Twilight phenomena 3. Rayleigh scattering.**—*Author's abstract.*

8.4–322 551.593.55:551.521.16

Słomka, Jan. **Jasność nieba zmrokowego.** [Brightness of the twilight sky.] *Przegląd Meteorologiczny i Hydrologiczny*, Warsaw, 7 1 2 :31–35, **1954.** fig., table, eqs. English summary p. 35. **DWB, DLC**—The method and results of measurements of sky brightness during twilight carried out at Tarnobrzeg (50°34′N, 20°41′E) in Aug. 1952 in order to examine the effect of the turbidity of the atmosphere with the aid of a selenium photocell placed horizontally under conditions of good and of reduced transparency of the atmosphere—are presented and discussed. The transparency was estimated before sunset with the aid of an Ostwald-Linke scale. The results, presented in a table, a diagram, and an equation by F. Schembor, show that contrary to daylight sky, the increase of turbidity of the atmosphere at twilight produced a lessening of the total brightness of the sky. *Subject Headings:* **1. Twilight sky brightness measurements 2. Turbidity 3. Tarnobrzeg, Poland.**—*A.M.P.*

8.4–323 551.593.63:551.574.1

Klinov, F. Ia., **Galo i ledianye kristally.** [Halo and ice crystals.] *Priroda*, Moscow, 44 9 :85–87, Sept. **1955.** 2 tables. **DLC**—A description of the most frequent and complicated halos observed at Verkhoyansk and the atmospheric ice crystals with which they were associated. Diagrams of the halos and photographs of the ice crystal types are included. *Subject Headings:* **1. Halos 2. Ice crystals.**—*I.L.D.*

8.4–324 551.593.652

Hesstvedt, Eigil, **Aerological investigation of some mother of pearl cloud situations.** *Norske Videnskaps-Akademie i Oslo. Institutt for Vaer- og Klimaforskning. Report*, No. 1, **1955.** 8 p. 4 figs., 4 tables, 5 refs. **DWB**—The most important measurements and theories concerning nacreous clouds from Mohn (1893) to Störmer (1941) and Dietrichs (1950) are reviewed and the theory that the clouds form in connection with lee waves set up by a mountain ridge is considered the most widely accepted today. The author believes that the clouds form by forced lifting of warm stratospheric polar air over a wedge of cold stratospheric tropical air. The situations on Jan. 10, 17 and 18, 1949 when Störmer recorded mother-of-pearl clouds in Norway, are analyzed from synoptic and aerological data. Statistics of monthly frequency of clouds, extremely low temperatures and upper winds from NW show Dec.–Feb. the most likely months (94% of cases) for the phenomenon. *Subject Headings:* **1. Nacreous clouds 2. Stratospheric temperatures 3. Norway. I. Störmer, Carl.**—*M.R.*

8.4–325 551.593.7:591.17

Waterman, Talbot H., **Polarized light and animal navigation.** *Scientific American*, N. Y., 193 1 :88–94, July **1955.** diagrs. **DLC**—Insects and underwater animals are known to be sensitive to polarized light from the sky, and thus to be able to guide themselves directionally as long as light from near the zenith is visible. Theory of polarization of sun (sky) light and of effect on simple or complex eye structure of humans and insects is lucidly explained and illustrated. *Subject Headings:* **1. Sky light polarization 2. Animal navigation.**—*M.R.*

ELECTRICAL PHENOMENA

See also: **Abnormal V.H.F. propagation** (Hooper), 8.4–83; **Radar observations from lightning** (Ligda), 8.4–88; **Ionization chambers** (Kemp), 8.4–125; **Vertical motion in atmos. and VHF radio** (Moler, Arvola), 8.4 247; **Air humidity and electrical breakdown of air** (Köhrmann), 8.4–249.

8.4–326 551.594.1:551.574.1

Woessner, R. H. and Gunn, Ross (both, *U. S. W. B., Wash., D. C.*), **Measurements related to the fundamental processes of aerosol electrification.** *Journal of Colloid Science*, N. Y., 11(1):69–76, Feb. 1956. 4 figs., 9 refs., 2 eqs. **DLC**—It is concluded that "both theoretical and experimental analyses show that the observed charge distribution appearing on typical stable aerosols is fundamentally due to ionic diffusion." Between 350 and 600 individual measurements were made for each curve presented: for silica dust, freshly condensed water on NaCl particles and on sulfur particles, condensed from vapor, and on sprayed water droplets, and charge frequency distribution, aging and equilibrium relationships are shown on 4 graphs. Aging is said to be critically dependent on intensity of ionization. *Subject Headings:* **1. Aerosol electrification 2. Ion diffusion.**—*M.R.*

8.4–327 551.594.11:551.594.2

Berger, M., **Beeinflussung des luftelektrischen Potentialgefälles durch meteorologische Erscheinungen.** [Influence of atmospheric potential gradient by meteorological phenomena.] *Zeitschrift für Meteorologie*, 10(8):244–249, Aug. 1956. 14 figs., 2 refs. **DLC**—Hourly values of departures of potential gradient at Wahnsdorf from 10 hrs before to 2 hrs after passage of near thunderstorms and fronts are shown. As a basis, monthly "normals" were calculated for 1947–51. Changes before different thunderstorms varied greatly; when there was no precipitation they were often opposite to those of vapor pressure. Cold fronts were generally accompanied by a high potential gradient (+50 V/m); warm fronts had little effect. Absolute values were calculated for different directions of the upper current indicated by 500 mb contours. These varied in different years (1949–53), but currents from SW and N gave higher values (+160 to +140 V/m) than from NW and W (+80 to +60), especially in winter. *Subject Heading:* **1. Potential gradient variations.**—*C.E.P.B.*

8.4–328 551.594.11:551.594.2:551.577

Chalmers, J. Alan, **The vertical electric current during continuous rain and snow.** *Journal of Atmospheric and Terrestrial Physics*, 9(5/6):311–321, Nov. 1956. 2 figs., 17 refs., 8 eqs. **DWB**—Charge from nimbo-stratus cloud reaches the earth only by precipitation and conduction. Measurements of potential gradient F and total current I were made (set up described). During rain average I was 3.8×10^{-12} A/m² and F was −176 V/m, during snow I was -3.5×10^{-12}, but in both cases there were wide variations. Relations were represented by $I=-a(F+C)$, where (approx):

$$\text{Rain } a=11.8\times10^{-15}\frac{\text{A/m}^2}{\text{V/m}}, \qquad C=-140 \text{ V/m}$$

$$\text{Snow } a=\ 9.2\times10^{-15}\frac{\text{A/m}^2}{\text{V/m}}, \qquad C=+440 \text{ V/m}$$

There must be a process of charge separation in NbSt snow cloud which is in the same direction as the main charge separation in CuNb but in NbSt rain cloud (in which most or all the precipitation must have been solid for part of the time in the cloud) there is also a second process of opposite sign and comparable magnitude. *Subject Headings:* **1. Atmospheric electric current 2. Potential gradient 3. Electricity of precipitation 4. Nimbostratus.**—*C.E.P.B.*

8.4–329 551.594.12

†Nolan, P. J., **The equilibrium of ionization in the atmosphere and nuclear combination coefficients.** *Journal of Atmospheric and Terrestrial Physics*, 9(5/6):295–303, Nov. 1956. 3 tables, 17 refs., 10 eqs. **DWB**—The problem of ionic equilibrium in air containing nuclei is reviewed and the formula $q=\alpha n^2+bnZ$ is established, b having a wide range of variation with

nuclear radius. A number of equilibrium formulas and their validity in relation to observations are discussed. *Subject Heading:* **1. Ion equilibrium.**—*C.E.P.B.*

8.4–330 551.594.14:539.16:551.594.12

Hess, V. F.; Kisselbach, V. J. and Miranda, H. A., Jr. (all, *Fordham Univ., N. Y.*), **Determination of the Alpha-ray emission of materials constituting the earth's surface.** *Journal of Geophysical Research*, Wash., D. C., 61(2, Pt. 1):265–271, June **1956.** fig., 4 tables, 3 refs., eqs. **DLC**—It seemed to be of interest to investigate the emission of alpha particles from rocks and other surface materials of the earth in order to find out whether these processes play an important role in the ionization balance of the lower atmosphere. The alpha emission from surface material was measured with a scintillation counter and photomultiplier tube. The values given for the emissivities of vegetation, rocks, and soils indicate that alpha-ray emission plays a not very important role in the ionization balance of the lower atmosphere. The exhalation of radon from rocks was investigated and a means of correcting for spurious counts due to this cause is explored. *Subject Headings:* **1. Radioactive emanations 2. Radioactivity of soil 3. Ionization balance.**—*Authors' abstract.*

8.4–331 551.594.14 662.2:539.1

Sievert, Rolf M. (*Inst. of Radiophysics, Stockholm*), **Records of gamma radiation from the ground and beta radiation from radioactive debris in Sweden, 1950–1955, Pt. 1.** *Tellus*, Stockholm, 8(2):117–126, May **1956.** 14 figs., 4 tables, 30 refs. **DLC**—The γ radiation of the ground from natural and artificial radioactivity, and the β radiation from radioactive debris in the atmosphere, have been recorded in Sweden since 1950. On several occasions increased radioactivity has been observed, sometimes producing effects by far exceeding the variations of the normal level. Observations are reported on the influence of rain and snowfall, with and without the effects caused by transportation of radioactive debris from nuclear explosions. *Subject Headings:* **1. Radioactivity in the atmosphere 2. Atomic explosion effects 3. Radioactivity of soil.**—*Author's abstract.*

8.4–332 551.594.21:551.593

Malan, D. J., **Les décharges lumineuses dans les nuages orageux.** [Luminous discharges in thunderclouds.] *Annales de Géophysique*, Paris, 11(4):427–434, Oct./Dec. **1955.** 3 figs., 12 refs., eqs. English summary p. 427. **DLC**—An apparatus is described for photographing variations of luminosity inside thunderclouds during lightning discharges. It is found that there are continuous luminous processes in the cloud during the whole duration of all types of lightning discharges. Bright bursts of luminosity often follow each other at 4 to 12 millisec. intervals, indicating that the charge distribution is not uniform in the charge centers. The cloud is often luminous for periods of the order of 100 millisec. before the first leader to ground emerges below the cloud base whence it proceeds to earth at a velocity of the order of 10^7 cm/sec. Hence it is suggested that stepped leaders are often preceded by priming or breakdown processes of relatively long duration in the cloud. Considering all available information, it seems extremely likely that such a process is a discharge between the negative charge center and positive charge in the base of the cloud. *Subject Headings:* **1. Thundercloud electrification 2. Thundercloud luminosity.**—*Author's abstract.*

8.4–333 551.594.22(213):621.396.8

Aiya, S. V. Chandrashekhar, **Noise radiation from tropical thunderstorms in the standard broadcast band.** *Nature*, London, 178(4544):1249, Dec. 1, **1956.** 6 refs., 2 eqs. **DWB**—Power in watts produced by a typical flash in a tropical thunderstorm is $45/f^2$ where f is frequency in Mc./s. ($f>1$). Below this frequency only the stepped leader of discharges to ground radiates any significant power. On this basis power is

$$\frac{16.2}{f^2} \Big/ \left(1 + \frac{\delta^2}{4\pi^2 f^2 . 10^{12}}\right)$$

Subject Headings: **1. Radio noise 2. Lightning discharges 3. Tropical thunderstorms.**—*C.E.P.B.*

8.4–334 551.594.22

Malan, D. J. (*Univ. of Johannesburg*), **La distribution verticale de la charge négative orageuse.** [Vertical distribution of negative thunderstorm charge.] *Annales de Géophysique*, Paris, 11(4):420–426, Oct./Dec. **1955.** fig., table, 5 refs. English summary p. 420. **DLC**—In lightning flashes having several component strokes, the stroke showing the largest electrostatic field change has a tendency to occur at the beginning of the flash at distances less than 8 km and towards the end of the flash if the distance is larger than 8 km. These tendencies are consistent with a vertical progression of the discharge in the cloud. A vertical progression would lead one to expect that the slow field changes occurring during the intervals between strokes would be predominantly positive for flashes further than 20 km. It is found, however, that in South Africa as in Europe only a quarter of these field changes are positive the rest being zero or negative. For this reason it is suggested that these field changes are partly due to the disappearance of space charge above the cloud during a lightning discharge. *Subject Headings:* **1. Lightning discharges 2. Lightning strokes 3. Vertical distribution of lightning discharges.**—*Author's abstract.*

AURORAS

8.4–335 551.594.5

†Gartlein, C. W., **The aurora borealis.** (In: **Dynamic North.** Wash., D. C., Technical Assistant to Chief of Naval Operations for Polar Projects, 1956—Vol. 1, Pt. 11, **1956.** 17 p. (loose-leaf). 3 figs. (photos), 29 refs.) **DWB**—An illustrated outline summary of present knowledge of aurora borealis; structure, forms, physical characteristics, spectra, relation to other phenomena, theories, observation, photography, and a list of 29 refs. (1733–1955) to the most important works on aurora. *Subject Headings:* **1. Aurora borealis 2. Arctic.** —*M.R.*

8.4–336 551.594.5:551.510.535(99)

Shapley, A. H., **Clues to ionospheric conditions in the southern auroral zone.** *American Geophysical Union, Geophysical Monograph*, No. 1:86–90, **1956.** 4 figs., ref. **DLC**—While there is a considerable amount of experience with short-wave radio communication via the ionosphere from the many Antarctic expeditions beginning in 1911–12, quantitative determinations of ionospheric parameters exist for only a few places and for relatively short periods of time. From sweep-frequency vertical sounding observations at these few points on the Antarctic Continent and on surrounding islands, there is evidence of at least a rough north-south correspondence of F-region critical frequencies. The operation of a rather dense network of stations during IGY will be needed for any real description or understanding of these phenomena. The objectives of a number of analyses with data from the IGY period are mentioned. *Subject Headings:* **1. Auroral-ionospheric relations 2. Antarctica.**—*Author's abstract.*

8.4–337 550.38:551.594.51

Chapman, Sydney and Sugiura, Masahisa (both, *Geophysical Inst., Univ. of Alaska*), **Arc-lengths along the lines of force of a magnetic dipole.** *Journal of Geophysical Research*, Wash., D. C., 61(3):485–488, Sept. **1956.** fig., 2 tables, eqs. **DLC**—Formulae and tables for the arc-length along the lines of force of a magnetic dipole are given with reference to the earth treated as a sphere. These tables may prove useful in connection with the study of radio whistlers and of the motion of charged particles along the lines of geomagnetic force. *Subject Headings:* **1. Dipole fields 2. Auroral particles.**—*Authors' abstract.*

SFERICS

See also: **Sferics effects** (Piccardi), 8.4–90.

8.4–338 551.594.6:551.596.5:621.396.812

Humby, A. M. and Minnis, C. M., **Asymmetry in the performance of high-frequency radiotelegraph circuits.** *Institution of Electrical Engineers, London, Proceedings, Pt. B*, 103(10):553–558, July **1956.** 11 figs., table, 4 refs. **DLC**—It is sometimes found that the

performance of a trans-equatorial radiocommunication circuit in the high-frequency band differs considerably, at certain times of the day, from that in the opposite direction. This phenomenon has been referred to as 'circuit asymmetry' and, in the cases considered, it cannot be accounted for in terms of differences in the performance of the terminal equipment. Evidence is produced which tends to show that the asymmetry is sometimes due to the decrease in the signal/noise ratio in one direction which can occur when a distant thunderstorm area, lying in the direction of the main beam of the receiving aerial, reaches its diurnal activity maximum. *Subject Headings:* **1. Radio communication 2. Thunderstorm effects.**—*Authors' abstract.*

8.4–339 551.594.6:551.510.536 551.508.94:551.508.96

Storey, L. R. O., **Whistlers.** *Scientific American*, N. Y., 194(1):34–37, Jan. **1956.** figs. **DWB, DLC**—Whistlers differ from radio atmospherics in that they occur at long wave lengths, are drawn out rather than abrupt (as are clicks) and occur repeatedly at fixed intervals (as echoes do) when they are reflected back from the opposite hemisphere via the ionosphere. If they originate in opposite hemispheres, no click precedes whistlers. The theory is explained and illustrated and recorders (sound spectrograph) and records described and illustrated. The timing of the whistlers and (their length) after the lightning click gives a clue to the distance travelled, if frequency is taken into account. Results indicate that atmosphere (400 electrons/cc) extends up to 7,000 miles instead of 1500 miles and consists of ionized hydrogen, perhaps picked up by geomagnetic field as earth passes through space. *Subject Headings:* **1. Whistlers 2. Sferics 3. Height of atmosphere.**—*M.R.*

RADIO METEOROLOGY

See also: **Index of solar activity based on ionospheric measurements** (Minnis), 8.4–162.

8.4–340 551.594.7:551.590.25

Hines, C. O. and Pugh, R. E., **Spatial distribution of signal sources in meteoric forward-scattering.** *Canadian Journal of Physics*, Ottawa, 34(10):1005–1015, Oct. **1956.** 3 figs., 7 refs., 20 eqs. **DWB, DLC**—The spatial distribution of observable meteor trails is determined with the aid of the 'cylindrical approximation' appropriate to forward-scattering observations. Contour charts of the distribution are presented, and found to compare favorably with those obtained from a more exact analysis, presented in a companion paper. Typical effects of the signal durations are also examined. The whole is compared with an earlier development by Eshleman and Manning (1954), which treats closely related aspects of meteoric forward-scattering. *Subject Headings:* **1. Radio wave scattering 2. Meteor echoes.**—*Authors' abstract.*

8.4–341 551.594.7:551.510.535:535.51

Landmark, Bjørn, **A study of the limiting polarization of high frequency radio waves reflected vertically from the ionosphere.** *Geofysiske Publikasjoner*, Oslo, 19(7), **1955.** 46 p. figs., 33 refs., eqs. Price: Kr. 10.00. **DWB, DLC**—Polarization measurements made both at Kjeller and at Tromsø are reported and the experimental equipment is described. Twenty observations of the sense of polarization (sense of rotation of the field vectors) of the magneto-ionic third component, the z-component, all show that this component is polarized in the same way as the ordinary magneto-ionic component. This is in accordance with present theories which explain the z-component by a coupling mechanism. During quiet conditions the reflected waves both at Kjeller and at Tromsø, were found to be in general nearly circularly polarized as should be expected according to a full wave theory. However, departures from circularity were observed; these are explained by a statistical theory of limiting polarization developed in this paper, in which the reflected wave is treated as a sum of rays reflected within a cone about the vertical direction, the phases of the individual rays being distributed at random. On the basis of this theory effects of the limiting polarization of horizontal gradients and irregularities may be accounted for. Conditions under which departures from circularity were most frequently observed are described. *Subject Heading:* **1. Ionospheric radio wave polarization.**—*From author's abstract.*

8.4–342 551.594.7:551.510.535

Mullaly, R. F., **The calculation of group velocity in magneto-ionic theory.** *Journal of Atmospheric and Terrestrial Physics*, 9(5/6):322–325, Nov. 1956. 10 refs., 15 eqs. **DWB**—It is shown how the magneto-ionic group refractive index μ' may be calculated as a function of the direction of propagation θ by expressing both these quantities in simple form in terms of a parameter λ, which is given a series of values. A similar method gives μ' as a function of the electron density for a fixed value of θ. Whereas most computations of μ' made up to the present have required electronic calculating machines, the simplified formulae given here are suitable for use with a desk calculator. Throughout, the effect of collisions in the medium is neglected. *Subject Headings:* **1. Magneto-ionic theory 2. Radio wave propagation 3. Ionosphere theory.**—*Author's abstract.*

8.4–343 551.594.7:621.396

Schmelovsky, Karl-Heinz, **Partielle Reflektionen in schwachen troposphärischen Wellenleitern.** [Partial reflections in weak tropospheric wave-ducts.] *Zeitschrift für Meteorologie*, 10(8):239–243, Aug. **1956.** 2 figs., 6 refs., 8 eqs. **DLC** –This work describes an approximation process for obtaining the propagation constants in weak ducts. A diagram collects the results for some special height relations of the modified refraction index. *Subject Heading:* **1. Radio transmission ducts.**—*Trans. of author's abstract.*

ACOUSTICAL PHENOMENA

See: **High-frequency radiotelegraph performance** (Humby, Minnis), 8.4–338.

PART II. SELECTIVE ANNOTATED BIBLIOGRAPHY ON CLIMATE OF THE FOREST

By: *Isadore L. Dordick* and *Geza Thuronyi*

INTRODUCTION

Forest climatology is a special case of the climatology of enclosed space. It can be regarded as standing midway between the climatology of open space, where the meteorological variables are determined by the free unhampered circulation of the atmosphere, and that of a building or room within which the movement of the outside atmosphere is eliminated almost entirely and the meteorological variables are modified very considerably. Indeed the latter may be regarded as the limiting value which the forest climate approaches.

Forest climates can be considered thus as transitional climates with microclimatic properties. Their microclimates are a function of the external climate and of the internal forest structure including its atmosphere and vegetation. Forests influence the climate of the immediate environment and depending upon their extent they may affect the large scale climate of a region. As a result of the modification of the meteorological variables within the forest there results a specific heat balance which influences the vegetation in the forest and which plays a role in the total heat balance of the atmosphere.

This bibliography presents a representative selection of papers in which forest climates have been studied from the aspects of heat balance, the characteristics of the meteorological variables as modified in the forest, and the nature of forest climates as a transition climate. The literature on the effect of forests upon the microclimate of surrounding areas and upon the general climate has not been covered.

This bibliography has been prepared in consultation with and for the benefit of U. S. Army Quartermaster Research and Development Center, Environmental Protection Division.

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1873–1908

8D–1 551.588.6

*Ebermayer, Ernst Wilhelm F., **Die physikalischen Einwirkungen des Waldes auf Luft und Boden und seine klimatologische und hygienische Bedeutung. . . .** [Physical effects of forests on air and soil and their climatological and hygienic importance.] Aschaffenburg, Verlag C. Krebs, **1873.** 253 p. 4 figs., numerous tables (some fold.), refs. Also: Horton, Robert E., **Ebermayer's experiments on forest meteorology, trans. from Ebermayer's original work and converted into English units.** (Unidentified pamphlet.) 24 p. 21 figs., tables. **DWB**—This pioneer and historically important work on forest climatology contains detailed data on the behavior of the meteorological variables within forests and presents a picture of forest climates. It contains data on the daily, monthly and annual variation of soil temperature, air temperature and humidity in forests, evaporation from a free water surface in the forest and in the open, the relationship of evaporation on forested soil to that on soil deprived of timber growth, a comparison between precipitation in forests and in the open and the ozone content of air in forests as compared with that in the open. Numerous tables containing the measurements are presented. *Subject Headings:* **1. Forest climatology 2. Forest meteorology 3. Translations. I. Horton, Robert E.**—*I.L.D.*

8D–2 551.588.6

Lorenz, Josef Roman (Ritter von Liburnau), **Wald, Klima and Wasser.** [Forest, climate and water.] Munich, R. Oldenbourg, **1878.** 284 p. 25 figs., tables. **DWB**—Pp. 124–149 contains a discussion of the characteristics of forest climate as a function of the interaction of the soil surface of the forest trees and forest canopy. The climatic data on temperature and humidity are taken from Ebermayer's book. *Subject Headings:* **1. Forest climatology 2. Climatic data.**—*I.L.D.*

8D–3 551.588.6:551.524:551.525

Nördlinger, Theodor, **Der Einfluss des Waldes auf die Luft- und Bodenwärme.** [Influence of the forest upon air and soil temperature.] Berlin, Paul Parey, **1885.** 100 p. 12 tables, 5 charts, refs. **DWB**—This is a comparative study of the air temperature and soil temperature in an open field and the air and soil temperatures in a forest. Data are presented on the daily variation of soil temperature during summer and winter at a level of about 6 feet and at tree top level and the annual soil temperature regime within the forest. The interrelation of air and soil temperatures within the forest are analyzed. *Subject Headings:* **1. Forest temperatures 2. Forest soil temperatures.**—*I.L.D.*

8D–4 551.524.32:551.588.6 551.525:551.588.6

*Schubert, Johannes, **Der jährliche Gang der Luft- und Bodentemperatur im Freien und in Waldungen und der Wärmeaustausch im Erdboden.** [Annual variations of the air and soil temperature in the open country and in woods.] Berlin, Julius Springer, **1900.** 53 p. charts, 26 tables, numerous refs. **DWB**—The temperature observations upon which this study is based were made at forest meteorological stations in Pomerania, Brunswick and Alsatia. The first part deals with the annual variation of air and soil temperature and their dependence upon geographical latitude and longitude and upon elevation above sea level, the annual variations of air and soil temperatures in fir, beech and spruce forests, and their deviations from temperatures in the open country are analyzed. Part 2 deals with the observational and theoretical aspects of heat conduction in the soil. Extensive numerical data are presented in tables. *Subject Headings:* **1. Annual air temperature variations 2. Annual soil temperature variations 3. Forest temperatures.**—*I.L.D.*

8D–5 551.524:551.571.4:551.588.6

***Rudovits, L., Raspredelenie temperatur i vlazhnosteĭ v nizhnikh sloiakh vozdukha v prisutstvii drevesnoĭ rastitel'nosti.** [The distribution of temperature and humidity in the lower layers of the atmosphere in the presence of woody vegetation.] Reprint from *Leningrad. Lesnoĭ Institut (i.e. Lesotekhnicheskaia Akademia), Izvestiia,* No. 18, **1908.** 68 p. 25 figs., refs., tables. German summary p. 67–68. **DWB**—The author presents the results of an extensive study carried out during the summer of 1906 in order to determine the air temperature and moisture distribution in stands of Prunis, Salix, Evonymus, Amygdalus nana etc. Observations were made twice daily (occasionally also hourly and bi-hourly) at the ground surface, and at the vegetation canopy as well as at intermediate levels. Data are presented on the vertical distribution of temperature, absolute humidity and relative humidity during insolation and during the predominance of outgoing radiation. Profiles as well as numerical data of the distribution of meteorological variables are given. *Subject Headings:* **1. Forest temperatures 2. Humidity in forests 3. Forest microclimatology.**—*I.L.D.*

1913–1918

8D–6 551.573:534.94

Fuller, George D.; Locke, J. R. and McNutt, Wade, **Stratification of atmospheric humidity in the forest.** Reprint from *Illinois Academy of Science, Transactions,* 6:100–102, **1913.** 2 figs.,

2 refs. **DWB**—The results of a study on the evaporating power within a forest at different elevations (3, 5 and 8 meters) above the ground carried out during May and June 1912 at the different forests in Illinois are presented by means of graphs. The evaporation power of the air in the medium strata of the foliage increased considerably with elevation above the soil surface, being about twice as great as at the ground. *Subject Headings:* **1. Evaporation from forests 2. Evaporation from soil surfaces 3. Illinois.**—*I.L.D.*

8D–7 551.521.6:551.588.6

*Knuchel, Hermann, **Spektrophotometrische Untersuchungen im Walde.** [Spectrophotometric research in forests.] *Schweizerische Centralanstalt für das Forstliche Versuchswesen, Zürich, Mitteilungen*, 11(1):1–94, **1914.** 39 figs., 6 tables, foot-refs. **DA**—This extensive study on the effect of the forest upon the spectral components of light penetrating into it contains a summary of the literature pertaining to this field of research, a description of the spectrum photometer including its calibration and operation, an analysis of the spectral characteristics of daylight, and the following aspects of the influence of the forest upon light, namely the light penetrability of green leaves, light under individual trees and stands, light under the crowns of isolated trees of various tree species, light conditions under a stand canopy, and light intensities under leafless canopies. Extensive numerical data are presented. *Subject Headings:* **1. Light intensities in forests 2. Spectral light penetration into forest 3. Spectrophotometers.**—*I.L.D.*

8D–8 551.588.6

Tol'skiĭ, A., **Klimat sosnovykh nasazhdeniĭ buzulukskogo bora samarskoĭ gub.** [Climate of the pine stands of the Buzulukov pine forest at the Samara estuary.] *Meteorologicheskiĭ Vestnik*, Leningrad, 28 (1/12):77–104, **1918.** tables, foot-refs. **DLC**—Meteorological observations carried out over a period of six years at two stations, one situated in an open field and the other beneath a canopy of pure pine stand, located in the extreme southeast limit of distribution of pine trees namely the Buzulukov pine forest situated on dry sand at the mouth of the Samara. Observations were made thrice daily and relative humidity and saturation deficit at both stations, mean monthly differences between the two stations with respect to these values for each year; and data on precipitation and snow cover presented. *Subject Headings:* **1. Forest microclimatology 2. Pine forests 3. Samara River, U.S.S.R.**—*I.L.D.*

1924–1926

8D–9 551.555.9:551.588.6

Marczell, György, **Erdős területek szélviszonyairol.** [Wind conditions of forest regions.] *Földrajzi Közlemények*, Budapest, 52 (7/10):97–109, **1924.** 3 tables, 2 refs., 5 eqs. **DWB**—Data on wind velocity at various heights in and outside several types of forest are tabulated for the flatlands near Szeged, Hungary (Nov. 1922 and Aug. 1923). Generally wind velocity was found to decrease on the windward side of a forest and again inside the forest. On the leeward side a further decrease is noted (due to expansion). This is followed by an increase, sudden at first, then gradually becoming more moderate. There is no congestion of air inside the forest, as some of the air escapes through the canopy. *Subject Headings:* **1. Forest winds 2. Szeged, Hungary.**—*G.T.*

8D–10 551.585:634.94

†Allee, W. C., **Measurement of environmental factors in the tropical rain-forest of Panama.** *Ecology*, Brooklyn, N. Y., 7(3):273–302, July **1926.** 9 figs., 5 tables, 32 refs. **DLC**—Meteorological observations were made during Jan.–March 1924 on Barro Colorado Island in Gatun Lake in the Canal Zone in order to illustrate the climatic regime within a tropical rain forest. The characteristics of the structure of the rain forest under investigation and the general climate of the Canal Zone including the meteorological variables of temperature, rainfall, relative humidity, cloudiness, atmospheric pressure and wind, the behavior of which is represented by means of graphs. This is followed by a detailed description of the vertical gradient of the individual meteorological variables within the forest from the forest floor to the canopy. Wind velocity, temperature, evaporation and light intensity, especially the latter, are analyzed in detail. Both graphical and numerical data are given for the meteorological variables within the forest. *Subject Headings:* **1. Rain forest climate 2. Barro Colorado Island, Canal Zone.**—*I.L.D.*

8D–11 551.588.6

*Geiger, Rudolf, **Untersuchungen über das Bestandsklima, I.** [Investigations on forest climate, Pt. 1.] *Forstwissenschaftliches Centralblatt*, 47:629–644, Sept. 1, **1925. Pt. 2,** *Ibid.*, p. 848–854, Dec. 1, **1925. Pt. 3,** *Ibid.*, 48:337–349, May 15, **1926. Pt. 4,** *Ibid.*, p. 495–505, July 15, **1926. Pt. 5,** *Ibid.*, p. 523–532, Aug. 1, **1926.** 15 figs., tables, refs. **DA**—A systematic study of the nature of the climate within forests resulting from the influence of the characteristics of the forest with

special reference to the practical applications of forest climatic studies to silviculture. Pt. 1 contains a discussion of the methodology of the investigations, a description of the forest, tree growth, soils, etc. of the experimental stand "Lehmlache I," the instruments and their calibration and the installation of the instruments. Pt. 2 deals with wind conditions, temperature and humidity conditions during the fall of 1924 of Lehmlache I. Pt. 3 is concerned with comparative observations carried out at a neighboring fir stand, designated Lehmlache II. The experimental set up is described and the meteorological observations are analyzed. The analysis deals with the diurnal extremes of air temperature and humidity, wind velocities and evaporation. Pt. 4 contains a discussion of the nature and cause of short period aperiodic temperature oscillations, observations of short period aperiodic temperature oscillations including sum of temperature oscillations in a 24-hour interval, the relationships of four observation points to one another in respect to aperiodic temperature oscillations, the daily variation of temperature oscillations and the frequencies of the magnitude of temperature oscillations. Pt. 5 considers the short period aperiodic temperature oscillations in open country, the causes of these temperature oscillations and the short period oscillations of relative humidity in the forest. *Subject Headings:* **1. Forest microclimatology 2. Temperature oscillations.** —*I.L.D.*

8D–12 551.525:551.584.41

*†Li, Tsi-tung, **Soil temperature as influenced by forest cover.** *Yale Univ. School of Forestry, Bulletin*, No. 18, **1926.** 92 p. 21 figs., 61 tables, 67 refs. **DA**—"The object of this investigation is to study the effect of forest and grass cover on soil temperatures at different depths expressed in terms of daily maximum and minimum. In connection with the main study the effect of the forest and the grass cover on air temperature, evaporation and soil moisture were also studied." Five stations were established in a contiguous area located in areas of various stages of forest growth and in a denuded area. The contents of this paper include the following: an historical review of the subject of soil temperature studies in various parts of the world, the instrumentation and procedure, climates of the experimental area, the Ashuelot Valley, the data on soil temperature and moisture, evaporation, insolation, effect of forest on soil temperature, effect of grass cover on soil temperature, effect of forest or forest canopy and litter upon soil temperature, etc. The data are presented in tables. (*Same item as* 2C–187, March 1951, *MAB.*) *Subject Headings:* **1. Soil temperature data 2. Forest soil temperatures 3. Vegetation influences 4. Ashuelot Valley, New Hampshire.**—*I.L.D.*

1931

8D–13 551.524.37:551.521.2:551.584.41

Falckenberg, G., **Muldenfrost und Frostflächen in Waldlichtungen.** [Frost pockets and frost areas in forest clearings.] *Meteorologische Zeitschrift*, 38(1):22–25, **1931.** 2 figs., refs. **DWB**—The dependence of nocturnal sky radiation upon the zenith distance produces a lowering of temperature on concave surfaces as a result of the fact that the slopes of the concave surfaces exclude the more intense sky radiation of great zenithal distance. This conclusion is based on an analysis of the radiation balance of a hollow. The author discusses the dependence of the nocturnal heat balance upon the zenithal distance and frost protection of thin hedges during wind. *Subject Headings:* **1. Radiation balance 2. Frost pockets 3. Forest influences on night frosts.**—*I.L.D.*

8D–14 551.588.6

*Geiger, Rudolf and Amann, Hans, **Forstmeteorologische Messungen in einem Eichenbestand, I.** [Forest meteorological measurements in an oak stand, Pt. 1.] *Forstwissenschaftliches Centralblatt*, Berlin, 53(7):237–250, **1931.** 6 figs. **Pt. 2,** *Ibid.*, 53(10):341–351, **1931. Pt. 3,** *Ibid.*, 53(2):705–714, **1931. Pt. 4,** *Ibid.*, 53(23):809–819, **1931. Pt. 5,** *Ibid.*, 54(11):370–383, **1932.** 29 figs., tables, refs. **DWB, DA**—A series of five papers containing the results and analysis of meteorological characteristics of an oak forest. The first paper describes the purpose and origin of the experiments, the choice of experimental plot, the observation installations, the instruments and observation periods. In the second paper, the wind data are presented and analyzed. The frequency of hours with calm and the measured wind velocities are discussed. The third paper deals with light penetration and amount, and air temperature at different elevations above the ground surface. The fourth paper is concerned with the principles of thermoelectrical measurement of temperature and the use of such apparatus. The last paper is essentially a methodological discussion of the meaning of temperature values measured by thermoelectric means, the average temperature conditions, variability of temperature, the diurnal temperature regime, etc. The data are presented in tables and graphs and both diagrams and photographs of the experimental procedure and experimental plots are given. *Subject Headings:* **1. Forest meteorological measurements 2. Wind data 3. Thermoelectric measurement 4. Forest temperatures.**—*I.L.D.*

1934

8D 15 551.584.41

*Koch, Horst Günther, **Temperaturverhältnisse und Windsystem eines geschlossenen Waldgebietes.** [Temperature and wind conditions of a closed forest area.] *Leipzig. Universität. Geophysikalisches Institut, Veröffentlichungen*, 2nd Ser., 6(3):121–175, **1934.** 23 figs., table, 12 refs. **DLC**—A study of the temperature of the Hubertsburg-Wermsdorf forest area was made during Feb. 1933–March 1934. Horizontal temperature distribution was obtained through automobile traverses with a resistance thermometer. Vertical temperatures were measured at 0.1, 0.5, 3.0, 5.0 and 8.0 m above the ground. An analysis is presented of the vertical temperature distribution in the forest, of the horizontal temperature including the night isothermal pattern and the daily variations of temperature in forest stands, the relationship between air mass and forest climate and of the orographic influence upon the temperature field. Also a discussion of the forest wind and of the downslope wind and of the downslope wind of the Collmberg are included. Data are presented in graphs and tables. *Subject Headings:* **1. Forest microclimatology 2. Microclimatic data 3. Hubertsburg, Germany.**—*I.L.D.*

8D–16 551.508.2:535.245:634.94

Lauscher, Friedrich and Schwable, Wilhelm, **Untersuchungen über die Helligkeit im Wald und am Waldrand.** [Investigations on light intensity in a forest and at the edge of a forest.] *Meteorologische Zeitschrift, Bioklimatische Beiblätter*, Brunswick, 1(1):60–65, **1934.** 3 figs., tables, refs. Also Lauscher's **Supplementary note,** *Ibid.*, 1(3):137. **DWB**—Light intensity measurements were carried out in various forests near Pressbaum and Lunz by means of Lange photoelectric cells which respond chiefly to green and yellow wave lengths. The rapid temporal fluctuations of light in the forest were investigated with the aid of a ten wire recorder. When the forest was in full foliage, the outside light was reduced to 5% in the beech forest, by ash to 25%, to a range of 6–17% by the Pressbaum spruce forest, and to 1.5% in the unthinned spruce forest at Lunz. Other studies on the relationship between light and vegetation are discussed. *Subject Headings:* **1. Light intensities in forests 2. Photoelectric cells.**—(*Trans. of Author's abstract.*)

8D–17 551.508.21:551.584.43

Schanderl, Hugo, **Ein Aktinometer für botanische Zwecke.** [An actinometer for botanical purposes.] *Planta*, Berlin, 22(3):428–442, **1934.** 4 figs., 20 refs. **DLC**—After briefly discussing the importance of radiation measurements in plant physiology and the inadequacy of the Linke actinometer, the author describes an actinometer which measures the intensity of solar radiation, the radiation transmissibility of leaves, and measurement of radiation impinging upon the leaf from above and diffuse radiation from below. The structure, calibration and operation of the new actinometer is described with the aid of photographs. The results of measurements are presented. *Subject Headings:* **1. Actinometers 2. Leaf radiation.**—*I.L.D.*

8D–18 551.524:551.584.41

Seltzer, Paul, **Influence d'une forêt sur la température de l'air.** [Influence of the forest on air temperature.] *Académie des Sciences, Paris, Comptes Rendus*, 199(6):435–438, Aug. 6, **1934.** 3 figs. Also his: **Sur la répartition verticale de la température en foret.** [The vertical distribution of temperature in forests.] *Ibid.*, 199(9):534–535, Aug. 27, **1934. DLC**—Temperature measurements in an oak stand (Hagenau forest on the lower Rhine) at five different elevations from 1.45 m to 11.90 m show the following influences of the forest upon air temperature: the greater the distance from the earth's surface the later is the temperature maximum; the highest temperature is found near the tree crowns. A warm air incursion does not penetrate into leafless stands. A stand covered with leaves does not hinder the incursion of cold air. According to the second paper the daily temperature maximum is always at the surface. The highest temperatures occur always two hours after sunrise at the tops, towards noon in the middle of the crown and again at the top where they disappear ten hours after sunset. An inversion is present above the tree crowns at night; a slightly marked maximum at the bases, and another inversion below. At tree top level the temperature of the leaves is 2.5°C below that of the surrounding air. Simultaneous measurements in a stand and outside on a meadow show that the forest temperature is higher and the gradient smaller. *Subject Headings:* **1. Forest temperatures 2. Hagenau, France.**—*I.L.D.*

8D–19 551.574.41:551.588.6

Skriabin, M. J. and Semenov, A. E., **Mikroklimaticheskie izmereniia na Voronezhskoi Geofizicheskoi Observatorii.** [Microclimatic measurements at the Voronezh Geophysical Observatory.] *Klimat i Pogoda*, No. 3(54):18–19, **1934.** 2 tables. **DWB**—During the summer of 1932, quantitative measurements of dew were made by means of blotting paper and observations of minimum temperature were recorded. Lowest temperatures and maximum amounts of dew were observed

at the edge of the forest, whereas highest temperatures and 10–19% less dew occurred within the forest. (*Same item as* 3D–134, April 1952, *MAB.*) *Subject Headings:* **1. Dew observations 2. Forest influences 3. Voronezh, U.S.S.R.**—*N. T. Zikeev.*

8D–20 551.584.31:551.588.6

*Ungeheuer, H., **Mikroklima in einem Buchenhochwald am Hang.** [Microclimate of a beech forest on a mountain slope.] *Meteorologische Zeitschrift, Bioklimatische Beiblätter*, Brunswick, 1(2): 75–88, **1934.** 4 figs., 17 tables, 4 refs. **DWB**—A microclimatic station consisting of three measurement points each provided with a dry and wet resistance thermometer at varying heights was established in a beech forest along an extended mountain slope and operated for over a year. The observation station is described with the aid of photographs and data are presented on daily variation of air temperature throughout the year, temperature extremes, the characteristics of temperature amplitudes, temperature differences between the Taunus Observatory and the forest station, humidity measurements, the influence of the mountain wind, etc. *Subject Headings:* **1. Slope microclimatology 2. Forest microclimatology.**—*I.L.D.*

1936

8D–21 551.586:612:551.506 551.588.6

*Faust, Reinhard, **Das Abkühlungsklima im Walde und auf freiem Felde nach Frigorimeterregistrierungen.** [Cooling climate in a forest and in an open field on the basis of frigorimeter recordings.] *Leipzig. Universität. Geophysikalisches Institut, Veröffentlichungen, Ser. 2,* 8(1):1–75, **1936.** 32 figs., 8 tables, 19 refs. **DLC**—Cooling power was measured with continuous recording Davos frigorimeters situated 1.5 m above the ground in a pine forest and an open field; measurements were made during 1934 and 1935. The article contains the following: a detailed description of the instrumentation and the method of measurement, physical analysis of the cooling process and a derivation of the heat loss equations, a consideration of influence of meteorological variables upon cooling power including the effect of microclimate temperature variations, the effective radiation of the frigorimeter globe, and the increase in cooling power due to precipitation; variations of cooling power in microclimatic space, the daily variations of cooling power, disturbances in daily variation of cooling power; cooling power of the forest (presented as monthly, mean monthly maximum and minimum and variability); and the relationship between cooling power and air mass. (*Same item as* 6K–44, Nov. 1955, *MAB.*) *Subject Headings:* **1. Cooling power data 2. Davos frigorimeter 3. Forest influences on cooling power.**—*I.L.D.*

8D–22 551.584.41

Geiger, Rudolf, **Weitere Bemerkungen zum Kleinklima am Bestandsrand.** [Additional remarks on the microclimate at the edge of a forest.] *Forstwissenschaftliches Centralblatt*, Berlin, 58(8):262–266, **1936.** 2 figs., table. **DA**—The author discusses the origin of the microclimate at the edge of the stand as a result of the interaction of the transition climate between open country and forest and of the role of the forest as a natural wall creating shade which influences directly, radiation, wind, precipitation etc. The radiation and wind conditions at the edge of the stand and nocturnal outgoing radiation in general and with particular reference to that occurring at the margin of a forest are considered. *Subject Headings:* **1. Forest microclimatology 2. Forest influences.** —*I.L.D.*

8D–23 551.586:612:551.506(43) 551.588.6

*Lehmann, Helmar, **Mikroklimatische Untersuchungen der Abkühlungsgrösse in einem Waldgebiete.** [Microclimatic studies in cooling power in a forest.] *Leipzig. Universität. Geophysikalisches Institut, Veröffentlichungen,* 7(4):193–255, **1936.** 18 figs., 5 tables, 4 plates, 94 refs. **DLC**—A thorough study of the influence of microclimatic factors and of local characteristics upon cooling power based upon 15,088 observations made over a period of one year in different forest stands in the vicinity of the Geophysical Observatory of the University of Leipzig. The contents of this article are as follows: a description of the measurement procedure; the theory of cooling power including the application of physical heat theory to cooling power, dry cooling power without external radiation effects, radiation effects, wet cooling power; the physics of cooling power including a discussion of the heat transfer number for free and forced circulation (dependence upon locality and air mass), albedo of the katathermometer, wet katathermometer, the daily variation of cooling power, vertical variation of cooling power, etc., cooling power gradient "isofrigores" or lines of equal cooling power, climagrams and wind variation, and variation of cooling power. Observational data for specific days are given in tables. (*Same item as* 6K–46, Nov. 1955, *MAB.*) *Subject Headings:* **1. Katathermometers 2. Cooling power data 3. Forest influences on cooling power 4. Leipzig, Germany.**—*I.L.D.*

8D–24 551.586:612:551.506(43) 551.588.6

*Lehmann, Helmar, **Physikalische und mikroklimatische Untersuchungen der Abkühlungsgrösse.** [Physical and microclimatic investigations on cooling power.] *Meteorologische Zeitschrift, Bioklimatische Beiblätter*, 3:107 111, 1936. 6 figs., 3 tables, 11 refs., eqs. **DWB**—The physical theory of heat is applied to the equation of cooling power and the constants are calculated on the basis of numerous observations made at the Geophysical Observatory of the University of Leipzig. Then cooling power is used as a microclimatic characteristic of forest climate as calculated by katathermometer measurements made on different days at hourly intervals at different elevations within a forest. (*Same item as* 6K–45, Nov. 1955, *MAB.*) *Subject Headings:* **1. Cooling power data 2. Katathermometers 3. Forest influences on cooling power 4. Leipzig, Germany.**—*I.L.D.*

1937

8D–25 551.584.41:551.524

Kanitscheider, Rudolf, **Temperaturmessungen in einem Bestande von Legföhren (pinus montana); Ein Beitrag zur speziellen Pflanzenklimatologie.** [Temperature measurements in a stand of *Pinus montana;* a contribution to special plant climatology.] *Meteorologische Zeitschrift, Bioklimatische Beiblätter*, 4(1):22 25, 1937. 2 figs., 3 tables, 2 refs. **DWB**—Atmospheric temperature was measured hourly for one day in a mountain pine stand situated 1600 m above sea level. Temperature was recorded at 0.02 m above the surface, in the branches, at the tree top and in the free air (3.75 m). The diurnal temperature variations including maximum, minimum and amplitude at the different levels are given in tables and the temperature "restlessness" or temperature oscillation as represented by means of the differences between single successive readings is described. *Subject Heading:* **1. Forest temperatures.**—*I.L.D.*

8D–26 551.584.41

Lositskii, K. B., **Izmeneniia nekotorykh meteorologicheskikh faktorov pod lesoi v sviazi s rubkami ukhoda.** [Variations of some meteorological factors under a forest cover in connection with cutting practices.] *V Zashchitu Lesa*, No. 3:24–29, 1937. 3 tables. **DA**—The increase of light penetration into the forest after cutting is directly proportional to its degree of cutting. Wind velocity also increases after cutting. Soil temperature rises. As a result of increased soil temperature and wind movement evaporation increases by as much as 40% in the case of intense cutting. Data are presented on its various degrees of cutting and the associated meteorological changes. *Subject Heading:* **1. Forest microclimatology.**—*I.L.D.*

8D–27 551.508.29

Albrecht, F., **Die Messgeräte des Wärmeumsatzes der pflanzenbestandenen Erdoberfläche unter besonderer Berücksichtigung von Messungen im Walde.** [Measuring instruments for the heat exchange of soil surfaces with plant cover with special reference to measurements in a forest.] *Zeitschrift für Angewandte Meteorologie*, 54(4):105–114; 54(5):137–146, 1937. **DWB**—With the aid of diagrams and photographs the author describes a resistance thermometer with compensation for radiation, a resistance hygrometer and a heating coil anemometer, all developed by the author. The installation of these instruments both in the open and in the forest is described. *Subject Headings:* **1. Resistance thermometers 2. Forest radiation measurement.**—*I.L.D.*

8D–28 551.521.16:551.588.6

*Sauberer, Franz and Trapp, Erich, **Helligkeitsmessungen in einem Flaumeichenbuschwald.** [Illumination measurements in a Quercus Lanuginosa forest.] *Meteorologische Zeitschrift, Bioklimatische Beiblätter*, 4(1):28–32, 1937. 4 tables, ref. **DWB**—An analysis of illumination measurements carried out in an oak forest characteristic of the northeast Alpine margin by means of a Lange corrected photoelectric cell. With the aid of simultaneous measurements upon a neighboring open meadow the illumination in the stand could be expressed as percent of that in the open. Accordingly for leafless forest the illumination was 58%; for forest half covered with leaves 29% and completely in leaf 19%. The data are presented in tables. Also the daily variation of illumination is discussed. *Subject Headings:* **1. Light intensities in forests 2. Photoelectric cells.**—*I.L.D.*

8D–29 551.521:551.588.6

*Sauberer, Franz, **Zur Kenntnis der Strahlungsverhältnisse in Pflanzenbeständen (mit einem Beitrag über Erfahrungen mit Photoelementen.** [Radiation conditions in plant stands (with a supplement on experience with photoelectric cells).] *Meteorologische Zeitschrift, Bioklimatische Beiblätter*, 4(4):144 155, 1937. 3 figs., 9 tables, 5 refs. **DWB**—After presenting a general discussion of the radiation balance in plant and forest stands the author discusses the use of and results obtained with photoelectric cells in the measurement of radiation penetration and reflection in plant stands. Data are presented on the sensitivity of various corrected photoelectric cells for metal filament light

with and without filters, on the spectral composition of light in stands, on brightness measurements with Lange cells without spectral filter in grain and clover fields and in forests and meadows, and on radiation balance measurements under trees and in a dense fir tree stand. *Subject Headings:* **1. Forest radiation 2. Photoelectric cells.**—*I.L.D.*

8D–30 551.584.41

*Smolík, Ladislav, **K mikroklimatu polabského lesa a louky.** [Microclimate of a forest and a meadow near the Elbe river.] *Lesnická Práce*, Písek, 16(10):461–468, Oct. **1937.** 4 figs. English and German summaries p. 467–468. **DA**—Temperature and relative humidity were measured at 5 and 160 cm above the ground in a pine forest and in the open. Representative comparative data are graphically presented. On clear and calm days atmospheric temperature was lower in the forest than over grass (except in the early morning and late afternoon). Temperature in the open was higher at 5 cm than at 160 cm; in the forest the reverse was true. Relative humidity varied inversely with temperature. *Subject Headings:* **1. Forest microclimatology 2. Microclimatic data.** —*G.T.*

1938

8D–31 551.588.6(59)

Carton, P. and Sallenave, P., **Considérations sur l'action réciproque des forêts et du climat.** [Interaction of forest and climate.] *French Indochina. Bulletin Économique de l'Indochine*, 41:293–319, **1938.** 5 photos. Photostat. **DWB**—Works of the past century (Hann, Klein, Sanson, Braak and others) on influence of vegetation on rainfall, are reviewed and application of ideas to conditions in Indo-China cited. It is concluded that forests are valuable in themselves, they protect soil and soil moisture, humidity and the microclimate in the immediate vicinity, but have little effect on the climate as a whole or on rainfall; they do affect ceiling height, turbulence, visibility and fog. Microclimatic data obtained in and outside of a forested area for the years 1933–37, are tabulated, showing the difference. The effect of climate on vegetation, and of vegetation on soil and on runoff is also considered in detail. (*Same item as* 4.3–280, March 1953, *MAB.*) *Subject Headings:* **1. Forest influences 2. Forest microclimatology 3. Indo-China.**—*M.R.*

8D–32 551.584.41:581.1

*Filzer, Paul, **Das Mikroklima von Bestandesrändern und Baumkronen und seine physiologischen Rückwirkungen.** [The microclimate of the peripheries of stands and canopies and its physiological consequences.] *Jahrbücher für wissenschaftliche Botanik*, Leipzig, 86(1/2):228–314, **1938.** 17 figs., 14 tables, refs. p. 312–314. **DA**—The peripheries of tree canopies and of tall tree stands constitute a microclimate and exposure climate which influences the structure and physiological processes of the peripheral plants. In this well planned and comprehensive field investigation, an attempt was made to obtain quantitative data on the relationship between this special microclimate and living processes of plants. The contents of this paper are as follows. Theoretical radiation conditions, practical applicability of meteorological data, measurements of light use on the peripheries of Polygonum stands, temperature of the air periphery of stands and tree canopies, daily march of air temperature in a Polygonum stand, the problem of the warmer exposure, differences between the winter and summer temperatures of the air of Picea; leaf temperature; the excess temperature of leaves above the temperature of the surrounding air; the daily variations of temperature; the variation of temperature on sunny days; temperatures on cloudy days; daily consumption of water of transpiration; assimilation at the peripheries of stands; morphological anatomical analysis of experimental plants; physiological analysis of peripheral organs including transpiration and desiccation experiments; daily variation in assimilation at the north, south, east and west peripheries of polygonum stands, etc. The data are presented in tables and in graphs. *Subject Headings:* **1. Forest microclimatology 2. Plant physiology.**—*I.L.D.*

8D–33 551.584.41

*Mařan, Bohuslav, **Stanovištní studie v porostech se smrkovým podrostem.** [Environmental study in stands with pine undergrowth.] *Lesnická Práce*, Písek, 17(11/12):615–646, **1938.** 4 figs., 2 photos, 4 tables, refs. p. 640–642. German and French summaries p. 642–646. **DA**—Conditions of the atmospheric surface layer and of the soil were observed on a comparative basis in a fir stand with pine undergrowth and one without undergrowth (July 1938). Atmospheric temperatures at 20 cm, soil temperatures and atmospheric relative humidity values (with undergrowth only) are tabulated and graphically presented. Atmospheric temperature at 20 cm was found to be higher with undergrowth than without (in the morning and evening, on cool days, and on the average). Soil temperature at 5 cm depth with undergrowth was higher in the morning, lower during the day; at 25 cm it was always lower with undergrowth. *Subject Headings:* **1. Forest microclimatology 2. Microclimatic data.**—*G.T.*

8D–34 551.521.16:551.588.6

Sauberer Franz, **Studien über das Lichtklima des Waldes.** [Studies on the light climate of forests.] *Österreichische Botanische Zeitschrift*, Vienna, 87:101–108, **1938.** 3 figs., 2 tables, refs. **DA**—The penetration of light into forests is examined under the three fold aspect of direct penetration, reflection from leaves trunks and branches, and radiation reaching the forest interior after penetration through leaves. The spectral characteristics of light after penetration through leaves and of reflected light in open meadows and in forests is discussed with the aid of numerical data. This is followed by the results of a study on the annual variation in the spectral transmission of beech leaves. *Subject Heading:* **1. Light intensities in forests.**—*I.L.D.*

8D–35 551.521.16:551.588.6

Trapp, Erich, **Untersuchungen über die Verteilung der Helligkeit in einem Buchenwald.** [Research on the distribution of illumination in a beech forest.] *Meteorologische Zeitschrift, Bioklimatische Beiblätter*, 5(4):153–158, **1938.** 3 tables, 5 illus. ref. **DWB**—Illumination measurements were carried out in a beech stand at an elevation of about 800 m near Lunz am See in Lower Austria. Measurements were made with two Lange photoelectric cells provided with platinum opal filters. Data are presented on the mean illumination upon 25 m^2 areas and on the vertical distribution of illumination in the forest. An illumination map showing distributions of illumination during overcast weather is included. *Subject Headings:* **1. Light intensities in forests 2. Photoelectric cells 3. Lunz am See, Austria.**—*I.L.D.*

1939

8D–36 551.521.16:551.588.6

Brocks, K., **Die räumliche Verteilung der Beleuchtungsstärke im Walde.** [Spatial distribution of illumination in forests.] *Zeitschrift für Forst- und Jagdwesen*, 71:47–53, **1939.** figs. **DA**—Illumination was measured on surfaces oriented in 12 directions and inclined in 3 different angles by means of a Lange selenium photoelectric cell mounted upon a theodolite and provided with a device for eliminating accidental disturbances of illumination. The illumination in an oak forest with and without leaves is compared with that outside the forest and the daily variation of illumination in the forest is analyzed. *Subject Headings:* **1. Light intensities in forests 2. Photoelectric cells.**—*I.L.D.*

8D–37 551.521.16:551.593.55:634.94

Deinhofer, Josef and Lauscher, Friedrich, **Dämmerungshelligkeit (Beobachtungen und Überlegungen).** [Twilight brightness: observations and analysis.] *Meteorologische Zeitschrift*, Brunswick, 56(3):153–159, April **1939.** 2 figs., refs. **DLC**—This study on twilight illumination contains a discussion of the reduction in the time of twilight brightness by trees and forests and several numerical observations on the actual reduction of twilight in mature and young forests, pine forests, etc. *Subject Headings:* **1. Twilight sky brightness 2. Forest influences on twilight sky brightness.**—*I.L.D.*

8D–38 551.588.6

Woelfle, Max, **Waldbau und Forstmeteorologie.** [Silviculture and forest meteorology.] Neudamm, I. Neumann, **1939.** 75 p. 15 figs., refs. **DWB**—This monograph constitutes a systematic treatment of forest meteorology. Beginning with a brief account of the history of forest meteorology and its importance in silviculture, the author then proceeds to examine the behavior of the various meteorological variables within the forest. The discussion includes the following: the radiational and topographic conditions involved in frost occurrence, radiation frost and development of the forest canopy, frost, frost threat and elevation, and measures for preventing radiation frost, temperature distribution as influenced by slope orientation and slope incline, temperature and structure of the stand; mean daily illumination including the significance of the illumination of the slope and stand; and sunshine conditions at the edge of a stand; importance of exposure and slope and snow conditions at the edge of a stand; stand structure and atmospheric humidity; wind conditions in forests as influenced by exposure of the slope, by stand structure, by canopy development etc., wind protection of forests and hedges, windstorm damage in forests, etc. *Subject Headings:* **1. Forest meteorology 2. Silviculture.**—*I.L.D.*

1940

8D–39 551.588.6:551.55

Fons, Wallace L., **Influence of forest cover on wind velocity.** *Journal of Forestry*, Wash., D. C., 38(6):481–486, June **1940.** 5 figs., 3 tables, 13 refs., 2 eqs. **DLC**—"Variations in wind velocity as influenced by height above ground and vegetation was studied in three common types of cover: grassland, bush and over-aged ponderosa pine stands." Three cup anemometers at the greatest

elevation, vane anemometers at intermediate levels and hot wire anemometers at the ground surface were used. The effects of cover type on wind velocity distribution are illustrated by means of graphs and numerical data on average wind velocities in the different covers are presented. The velocity of the wind was found to be greatly reduced at the top of the crown and remains nearly constant in the canopy zone. "In general the velocity of the wind in the forest is not a constant percentage of the velocity above the tree crowns." During midday conditions when the air temperature falls with height, the percentage decreases as the wind velocity above the crown increases. *Subject Headings:* **1. Forest influences on wind velocity 2. Wind velocity distribution 3. Anemometers.** —*I.L.D.*

8D–40 551.521.16:551.588.6

*Nägeli, Werner, **Lichtmessungen im Freiland und in geschlossenen Altholzbeständen.** [Light measurement in the open and in closed stands of old timber.] *Switzerland. Schweizerische Anstalt für das forstliche Versuchswesen, Mitteilungen, Zürich,* 21 (2):250–306, **1940.** 10 figs., 9 tables, 19 refs. French summary p. 301–305. **DA**—The measurements were carried out by means of selenium cells. The amount of light, in percent of the light in the open, that penetrated to the level of the ground flora in the course of the vegetation period, decreased in a coniferous stand from 8% previous to the formation of the new annual shoots to 4% in autumn, and in a broadleaved stand from 51% previous to leafing to 5% just before the foliage was shed. A mixed coniferous/broadleaved stand occupied an intermediate position in this respect. In this and the broad leaved stand the diffused light available in the course of a day varied in proportion to the amount of diffused light in the open. On the other hand, the proportion of direct light, if any, that penetrated the stands in the course of a day was extremely variable. During about one half of the vegetation period there was no direct light at all; during the other half, on an average, 40% to 70% of the light in the stands was diffused and the remainder direct. *Subject Heading:* **1. Light intensities in forests.**—*Forestry Abstracts.*

8D–41 551.521.14:551.588.6

Sakharov, M. I., **Radiatsiia i albedo v lesnykh fitotsenozakh.** [Radiation and albedo in forest phytocenoses.] *Meteorologiia i Gidrologiia,* Leningrad, No. 5/6:3–20, **1940.** 11 tables, 10 refs. **DLC**—An attempt is made to determine the dependence of total radiation and albedo upon the topographical characteristics of a forest and within a forest, upon the growth and density of the forest canopy and upon mixtures of fir in a phytocenose. Also the effect of isolated trees upon radiation was investigated. A Ianishevski pyranometer was used. Numerical data on total radiation, percent of radiation in open localities, illumination in lux and albedo associated with particular types of phytocenoses are presented in tables. *Subject Headings:* **1. Albedo of forests 2. Forest radiation 3. Albedo measurements 4. Pyranometers.**—*I.L.D.*

8D–42 551.555.6:551.524.37:551.588.6

Schubert, J., **Kälterückfälle und Nachtfröste. Wind-, Wasserdampf- und Waldeinfluss.** [Cold waves and night frosts. Influence of wind, water vapor and forest.] *Meteorologische Zeitschrift,* 57:406–410, Nov. **1940.** tables, 11 refs., eqs. **DWB**—From 57 years of record at Eberswalde the singularity of cold waves is computed and the frequency of minimum temperatures in May and June given. Influence of wind on minimum temperature is studied. Average May frost at a height of 0.1 m is: −2.4°C for calm weather, −0.5°C on windy nights, and at the height of the screen (2.2 m) −0.4 and 2.2°C, respectively. Relation between dew point and frost shown. Frequency of night frosts from May to Sept. was 8.6 days in open field, 5.0 in pine, 4.5 in fir, 4.2 in beech forests and only 1.7 days in the city. (*Same item as* 4C–239, March 1953, *MAB.*) *Subject Headings:* **1. Cold waves 2. Frost frequencies 3. Wind effects 4. Forest influences on night frosts 5. Eberswalde, Germany.**—*A.A.*

1941

8D–43 551.584.41

*Geiger, R., **Das Standortsklima in Altholznähe.** [Local climate in the vicinity of mature trees within a forest.] *Hermann-Göring-Akademie der Deutschen Forstwissenschaft, Mitteilungen,* 1:148–172, **1941.** 9 figs., 2 tables, 16 refs. **DLC**—In connection with the practical problem of rejuvenating forests and making clearings it is necessary to know the microclimatic conditions within a forest and the variations of the microclimate. This paper represents a study of the microclimate in a clearing within a forest and its variation with distance from the mature trees. With the aid of diagrams and photographs the author describes the experimental plot, the size of the opening and within the forest and radiation conditions within the opening. The local climate within the opening is investigated; temperature, wind, precipitation and atmospheric humidity by day, night temperatures and their significance in frost occurrence are discussed. Temperature distribution within the opening is presented. Finally the total local climate is described. Data are presented in tables and in graphs. *Subject Headings:* **1. Forest microclimatology 2. Local climates.**—*I.L.D.*

1942

8D–44 551.577.5:551.588.6

Lukkala, O. J., **Sateen mittauksia erilaisissa metsiköissä.** [Rainfall measurements in various stands.] *Acta Forestalia Fennica*, Helsinki, 50(23), **1942.** 13 p. 5 figs. Legends and summary (p. 12–13) in German. **DLC**—Measurements of rainfall were carried out daily in fir, spruce and beech forests in southern Finland during May–Oct. in order to determine the amount of rainfall intercepted by the tree canopy. Runoff from tree trunks was not measured. Graphs showing the daily amount of rainfall reaching the ground in the various stands as compared with the rainfall measured in the open, and the rainfall retained in the canopy are presented. The influence of the stand upon ground water level is discussed. *Subject Headings:* **1. Precipitation interception 2. Rainfall measurements 3. Finland.**—*I.L.D.*

8D–45 551.588.6:551.578.46

Niederhof, C. H. and Dunford, E. G., **Effect of openings in a young lodgepool pine forest on the storage and melting of snow.** *Journal of Forestry*, Wash., D. C., 40(10):802–804, Oct. **1942.** 4 figs., table, 2 refs. **DLC**—Experimental studies were carried out in the Fraser Experimental Forest at 9000 feet to determine the effects of crown openings of various sizes upon snow accumulation and melt in two young lodgepole pine stands and to estimate from the results the degree of cutting necessary in these young stands for maximum snow storage. Data are presented showing that snow storage and rate of melting are influenced by size of crown openings and that cutting which will provide a maximum number of shaded sheltered openings will favor optimum conditions for the storage and prolonged melting of snow. *Subject Headings:* **1. Forest snow pack 2. Snow accumulation 3. Snow retention.**—*I.L.D.*

8D–46 551.555.9:551.588.6

*Woelfle, Max, **Windverhältnisse im Walde, I.** [Wind conditions in a forest, Pt. 1.] *Forstwissenschaftliches Centralblatt*, Berlin, 61:65–75, Jan. **1939.** 6 figs., table. **Pt. 2,** *Ibid.*, p. 461–475, Aug. **1939.** 7 figs., table, foot-refs. **Pt. 3,** *Ibid.*, 64:169–181, **1942.** 7 figs., foot-refs. **DLC**—This series of studies carried out at several experimental plots of the Bavarian Forest Meteorological Institute is aimed at investigating the wind conditions at ground level around a tree which is selected relatively near to bushes, low stands etc., wind conditions in the periphery of a stand when the lower foliage of the stand has been removed up to a height of several meters above the ground; the influence of the lower and the intermediate foliage of a stand upon the wind velocities at the periphery of a stand and wind conditions within and above the canopy, a homogeneous old forest stand of uniform age. Each study includes a detailed description of the experimental plots (with the aid of photographs and diagrams) and of the experimental procedure. The wind data are presented in tables and diagrams. The data are analyzed and their significance to practical forestry is indicated. *Subject Headings:* **1. Forest winds 2. Bavaria, Germany.**—*I.L.D.*

1946–1947

8D–47 551.584.43:778.34

†Clark, Walter (*Kodak Res. Lab.*), **Photography by infrared, its principles and applications.** 2nd ed. New York, John Wiley and Sons, Inc., **1946.** 472 p. 93 figs. (incl. photos), 32 tables, bibliog. at end of each chapter. **DLC**—In Chap. 10 **Infrared photography applied to botany and paleontology,** the author discusses the absorption and reflection of light by leaves and the wave lengths, both in the visible and invisible spectrum within which these processes occur, the fluorescent properties of chloryphyll and its absorption characteristics, the absorption characteristics of other leaf pigments, the explanation of the white appearance of deciduous leaves on infrared photography, etc. *Subject Headings:* **1. Leaf radiation 2. Infrared photography.**—*I.L.D.*

8D–48 551.521.14:535.243:551.578.46

†*Krinov, E. L., **Spektral'naia otrazhatel'naia sposobnost' prirodnykh obrazovanii.** [Spectral reflectance properties of natural formations.] Moscow, Akademiia Nauk, **1947.** 270 p. 177 figs., 15 tables, 45 refs., append. 70 p., tables. **DLC.** Also: Translation E. Blekov, issued as *National Research Council of Canada, Technical Translation, TT-439,* **1953.** 268 p. 27 figs., 15 tables, 45 refs. **DWB**—This monograph contains a discussion and data on the albedo of different types of forests (birch, oak, fir, willow, linden, pine, elm, larch) during various stages of leaf development during different seasons. The data are presented in tables and in graphs in a supplementary atlas. (*For fuller abstract see* 3.3–131, March 1952, *MAB.*) *Subject Heading:* **1. Albedo of forests.**—*I.L.D.*

1948

8D–49 551.588.6:061

Geiger, Rudolf and Schnaidt, Fritz, **Das neue Versuchsfeld des Forstmeteorologischen Instituts München-Feldmoching.** [New experimental field of the Forest Meteorological Institute at eldmoching, Munich.] *Forstwissenschaftliches Centralblatt*, Berlin, 60(13):397–409, July **1948.** figs., table, refs. **DWB, DLC**—With the aid of photographs and diagrams the author discusses ie choice of the experimental field and describes its location and its meteorological and soil character- tics and the various instruments installed for measuring the meteorological variables. A sample easurement is presented and analyzed. *Subject Headings:* **1. Forest Meteorological Institute at lunich 2. Forest meteorological instruments.**—*I.L.D.*

8D–50 551.588.6:631.4(02)

*†Kittredge, Joseph, **Forest influences: the effects of woody vegetation on climate, water and oil. . . .** N. Y. McGraw-Hill, **1948.** 394 p. 25 figs., 71 tables, 381 refs. **DWB**—This book ontains a systematic discussion of forest influences upon climate and the various meteorological ariables within the forest as such. Ch. 6 deals with solar radiation and light, Ch. 7 with air tem- erature, Ch. 8 with wind, Ch. 9 with atmospheric moisture, Ch. 10 with precipitation, Ch. 11 with terception and stream flow, Ch. 12 with fog drip, Ch. 13 with evaporation and condensation, h. 14 with snow, Ch. 15 with influence of forest upon soil evaporation, Ch. 16 with soil temperature forests and Ch. 18 with influence of forest on soil moisture of forest floor. (*Same item as* 2–175, eb. 1950, *MAB.*) *Subject Headings:* **1. Forest influences 2. Hydrology 3. Textbooks.**—*I.L.D.*

8D–51 551.588.6:551.521

Sakharov, M. I., **O vliianii otdel'nykh iarusov lesnykh tsenozov na radiatsiiu i osveshchennost'.** [Influence of individual stories of forest associations upon radiation and illumination.] *Akademiia auk SSSR, Doklady*, 62(5):701–704, **1948.** 2 tables, 5 refs. **DLC**—The role of forest stories in ie function of a forest climate is effected primarily in their transformation of radiation and illumina- on. The author discusses the influence of upper tree story upon radiation, the influence of the cond tree story, radiant illumination, influence of undergrowth of woody species illumination and ie effect of the grass cover upon radiation and illumination. *Subject Headings:* **1. Forest radiation Light intensities in forests.**—*I.L.D.*

8D–52 551.521.16:634.94

Wellner, C. A., **Light intensity related to stand density in mature stands of the western white ne type.** *Journal of Forestry*, 46(1):16–19, Jan. **1948.** 2 figs., 3 tables. **DLC**—The method of stimating light intensity consists of relating it to measures of stand density. Figures based upon eterminations of light intensity in a number of uncut and cutover mature stands of the white pine ype relating to ten measures of stand density are given. These measures consist of summation of ameters per acre and basal area per acre. A table giving stand density equivalents for light tensity beneath the canopy of mature stands of the western white pine type is presented. *Subject leading:* **1. Light intensities in forests.**—*I.L.D.*

1949

8D–53 551.521.16:551.588.6

Elagin, I. N. and Zvorykina, K. V., **Osveshchennost' pod pologom nekotorykh tipov shiro- olistvennykh lesov (Severo-zapadnyĭ Kavkaz).** [Illuminations under the canopies of certain ypes of broad-leafed forests (Northwestern Caucasus).] *Akademiia Nauk SSSR, Doklady*, 66(4): 13–716, **1949.** table, 12 refs. **DLC**—Measurements of illumination under oak trees were carried ut during the summer of 1948 in the vicinity of the Belyĭ, Pshekha and Psekups Rivers in the north- est Caucasus. A multistep photometer which responds primarily to the blue-violet rays of the pectrum is described. A table gives the illumination in percent of those in the open country and ie corresponding type of forest. *Subject Headings:* **1. Light intensities in forests 2. Northwest aucasus.**—*I.L.D.*

8D–54 551.577.52:551.588.6

†*Hamilton, E. L. and Rowe, P. B., **Rainfall interception by chaparral in California.** U. S. Forest ervice, California Forest and Range Experiment Station, **1949.** 43 p. 16 figs., 6 tables, 74 refs. **WB**—Investigations made in 1937–1945 at North Fork Experimental Area and in the San Dimas xperimental Forest in Southern California shows that about 80% of rain reaching the chaparral anopy falls under the canopy, 15% reaches the ground as stemflow and 5% is lost by evaporation. hese figures vary with season and storm size. In fall and winter storms the percentages were 1–14 and 4, in spring and summer 74–12 and 14%, respectively. Results are shown in charts and ables. Methods are described and illustrated with photographs. *Subject Headings:* **1. Precipitation nterception 2. Southern California.**—*M.R.*

8D–55 551.584.41:551.55

Poppendiek, H. F., **Investigation of velocity and temperature profiles in air layers within and above trees and brush.** California University. Dept. of Engineering, March **1949.** 44 p. 1 figs., 3 tables, 7 refs., 29 eqs. **DWB**—Measurements of temperature, wind and stability made i and above an orchard, a brush field and a forest are compared with theoretical curves prepared on th basis of current ideas of boundary layer, turbulent exchange and roughness concepts. Measure velocities were predicted with an accuracy of about 15% for the three systems. (*Same item a* 4B–187, Feb. 1953, *MAB.*) *Subject Headings:* **1. Turbulence measurement 2. Forest influence 3. Wind profiles 4. Temperature profiles. I. California. University. Dept. of Engineering.**—*M.R.*

8D–56 551.556:551.521.16:551.588.6

Sakharov, M. I., **Vliianie vetra na osveshchennost' v lesu.** [Influence of wind upon illumination in a forest.] *Akademiia Nauk SSSR, Doklady,* 67(5):913–916, **1949.** table, 6 refs. **DLC**—The author investigated the role of the wind in influencing the mosaic character of light and the rapid fluctuations of light streams beneath the canopy of a forest. The results of observations on illumination under different types of forest stands, under different wind velocities are presented. Illumination was higher during wind velocities than during calm periods in all tree stands. The characteristics of illumination under different wind velocities are analyzed. It was found the most important factors influencing illumination in the presence of wind are weather, nature of wind, season of the year, altitude of the sun and nature of the tree stand. *Subject Headings:* **1. Light intensities in forests 2. Wind effects on illumination.**—*I.L.D.*

1950

8D–57 551.584(02) 551.584.41

†*Geiger, Rudolf, **Das Klima der bodennahen Luftschicht. Ein Lehrbuch der Mikroklimatologie.** [The climate near the ground. A textbook in microclimatology.] 3rd ed. rev. and enl. Brunswick, Vieweg, **1950.** 460 p. 195 figs., tables, bibliog. p. 408–446. **DWB**—Engl. trans. of 2nd ed. by M. N. Stewart and others. 2nd Printing rev. Cambridge Univ., Press, **1957.** 494 p. **DLC**—This fundamental treatise on microclimatology contains a systematic treatment of forest meteorology. Chapter 29 considers the relationship between agricultural and forest meteorology, the general nature of forest meteorology and its history and need of its study; Chapter 30 deals with the radiation balance and mass exchange of a mature forest; Chapter 31 with the temperature and humidity conditions in a mature forest; Chapter 32 with wind and precipitation in a mature forest; Chapter 33 with the influence of the forest structure upon the forest climate; Chapter 34 with the climate of clearings, and Chapter 35 with stand climates. Methods of study including experimental approaches, numerical and graphical data and bibliographical citations are presented. (*For full abstract on Engl. trans. see* 2.1–158, Jan. 1951, *MAB.*) *Subject Headings:* **1. Forest microclimatology 2. Microclimatology textbooks.**—*I.L.D.*

8D–58 551.577.52(436)(481)

*Godske, C. L. and Schieldrup Paulsen, H., **Investigations carried through at the Station of Forest Meteorology at Os, Pt. 2, The forest precipitation.** *Bergen. Universiteter Arbok,* 1949, *Naturvitenskapelig Rekke,* No. 8, [**1950**]. 36+p. 9 figs., 16+tables, 11 refs., 9 equations. **MH-BH**—No systematic studies of the effect of forests on rain and snowfall and measurement thereof since Hoppe conducted such experiments in spruce and pine forests in Austria in 1894 and 1895. The present study made in 1944–1946 in a spruce forest near Os, analyzes comparative data for 9 gages, according to distance from trees, direction of wind, etc. Compared with the Austrian data, there are marked differences arising from different types of forest in Norway and Austria. (*Same item as* 2.1–143, Jan. 1951, *MAB.*) *Subject Headings:* **1. Precipitation interception 2. Mariabrunn, Austria 3. Os, Norway.**—*M.R.*

8D–59 551.525.5:551.579.4:551.588.6(79)

Hale, Charles E., **Some observations on soil freezing in forest and range lands of the Pacific Northwest.** *U. S. Forest Service. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon, Research Notes,* No. 66, July **1950.** 17 p. 11 figs., 5 tables, 7 refs. **DWB, DLC**—Describes extent and kind of soil freezing under various forest and range types in Oregon and Washington during the severe winter 1949–50. Soils of the high Cascade Mountain forests remained unfrozen; discontinuous permeable frost occurred in the lower ponderosa pine and grass type; and up to 7.5 inches of impermeable frost occurred in the sagebrush and grass types during the winter and spring snow-melt period. One inch of impermeable "concrete" frost was sufficient to cause surface runoff from snow melt. Other observations showed that intensity of timber cutting had a decided effect on snow accumulation and recession in the Douglas-fir forest. Snow in depths over two feet afforded

protection against soil freezing. (*Same item as* 2.2-92, Feb. 1951, *MAB.*) *Subject Headings:* **1. Frozen soil 2. Runoff 3. Forest influences 4. Pacific Northwest.**—*Author's abstract.*

8D–60 551.524.31:551.588.6

Raabe, Ernst-Wilhelm and Kohn, Hans-Lothar, **Über Temperaturverhältnisse von Kahlschlag und Wald.** [On temperature conditions in clearing and forest.] *Meteorologische Rundschau*, 3(1/2):13–15, Jan.–Feb. **1950.** 4 figs., table. **DWB**—Gives curves of diurnal temperature variation 1 cm above ground, at surface and 2 and 10 cm depth on a hot summer day in bare open clearing, with fine turf, under dense spruce forest, mossy beech wood and beech with grassy undergrowth. From 2–10 cm depth, first two warmest in afternoon. (*Same item as* 8-61, Aug. 1950, *MAB.*) *Subject Headings:* **1. Microclimatic data 2. Forest temperatures.**—*C.E.P.B.*

8D–61 551.588.6

*Sapozhnikova, Serafima Afanas'evna, **Mikroklimat i mestnyĭ klimat.** [Microclimate and local climate.] Leningrad, Gidromet. Izdat., **1950.** 239 p. charts, diagrs., tables, graphs, eqs. **DLC**—English trans. issued **1956?** 501 p. tables, eqs. Carbon of typescript. **DWB**—Chap. 15 of this most detailed text on micrometeorology and microclimatology deals with every aspect of forest and forest glade climatology, with many numerical or graphical examples selected from Geiger and from Russian literature or observation. Radiation, temperature, humidity, wind, evaporation, heat balance, precipitation, snow and soil conditions in forests of various types and in clearings as compared with that in open fields are discussed. (*For abstract on whole work, see* 3.7-10, July 1952, *MAB.*) *Subject Headings:* **1. Forest microclimatology 2. Translations.**—*M.R.*

8D–62 551.584.41:551.556.2

Van der Linde, R. J. and Woudenberg, J. P. M., **On the microclimatic properties of sheltered areas: the oak-coppice sheltered area.** *Netherlands. Meteorologisch Instituut, Mededelingen en Verhandelingen, Ser. A*, No. 56, **1950.** 151 p. 40 figs., 52 refs. **DLC**—A study of the microclimatic properties of oak-coppice stands which are long, narrow strips of land planted with oak coppice and found frequently in the sandy parts of the cultivated regions of the Netherlands where the ground water level is not too high. The literature dealing with the influence of shelter belts on wind velocity, air and soil temperatures, relative humidity etc. is reviewed. Then the observations on the microclimate, namely temperature, relative humidity, wind velocity, evaporation and radiation within oak coppice during the fall and spring season of several years are discussed. The data are presented in graphs and a discussion of the behavior of these variables and their interaction to produce a specific microclimate is presented. *Subject Headings:* **1. Forest microclimatology 2. Shelter belt effects 3. Netherlands.**—*I.L.D.*

1951

8D–63 551.588.6:551.521.1

Brecheen, K. G., **Transmission of shortwave radiation through forest canopy.** *U. S. Corps of Engineers and U. S. Weather Bureau, Cooperative Snow Investigations, Research Note*, Oct. 15, **1951.** 12+p. 3 tables, 5 figs. (1 fold.), 4 refs. **DWB**—The relationship between canopy density, estimated from aerial or ground photos (from below), and the radiation amount which penetrates a forest cover are investigated. Both pyrheliometer and lightmeter readings were used. A detailed statistical investigation was made which, however, was not justified by the few widely scattered results. (*Same item as* 4.7-97 and 6.10-260, July 1953 and Oct. 1955, *MAB.*) *Subject Headings:* **1. Forest radiation 2. Solar radiation in forests.**—*A.A.*

8D–64 551.584.41

***†Burger, Hans, **Waldklimafragen, I, Meteorologische Beobachtungen im Freien und in einem Buchenbestand.** [Problems of forest climate, Pt. 1, Meteorological observations in the open and in a beech stand.] *Switzerland. Eidgenossisches Centralanstalt für das Forstliche Versuchswesen, Zürich, Mitteilungen*, 17:92-149, **1932.** 12 figs., 12 tables, 49 refs. French summary p. 143-146. **Pt. 2: Meteorologische Beobachtungen im Freien, in einem Buchen- und einem Fichtenbestand.** [Meteorological observations in the open, in a beech and in a spruce stand.] *Ibid.*, 18:7-54, **1933.** 24 figs., 6 tables, 22 refs. French summary p. 49–53. **Pt. 3: Meteorologische Beobachtungen im Freien, in einem gleichaltrigen Fichtenbestand und im Tannen-Fichten-Plenterwald bei Opplingen.** [Meteorological observations in the open, in a spruce stand of uniform age and in a thinned pine-spruce forest near Opplingen.] *Ibid.*, 18:153–192, **1933.** 14 figs., 3 tables, 20 refs. French summary p. 188–191. **Pt. 4: Meteorologische Beobachtungen im Brandiswald.** [Meteorological observations in Brandis Forest.] *Ibid.*, 27:19-75, **1951.** 25 figs., 20 tables, 53 refs. French summary p. 69–73. **DLC, DA**—This extensive forest meteorological study summarizes the meteorological observations made since 1889 at the experimental garden Adlerberg and in the neighboring beech stand (Forestry School near Zurich). Pt. 1 contains the following: the location and topography

of the stations; summer season averages (April–September) of precipitation in the forest and in the open country; precipitation in individual summer months; precipitation retention by tree canopies and distribution of precipitation amounts and duration; sunshine duration including: summer totals of sunshine duration, sunshine duration in the individual summer months, sunshine duration per day influence of sunshine duration upon temperature; air temperature and air humidity in forest and open country; evaporation in forest and open country and climatic quotients. In Pt. 2, the author examines the precipitation and sunshine duration using five year averages and then analyzes the characteristics of soil temperature and evaporation in particular in the forest and in the open country. Also data are presented on the daily variation of air temperature, relative humidity and wind velocity in relation to evaporation. In Pt. 3, which is made on the same pattern as the two previous ones, the author describes in detail, with the aid of photographs and diagrams, the observation stations including their location and layout. In addition to the observations on temperature and relative humidity, evaporation was investigated more extensively with the aid of an evaporimeter and Livingston atmometer. The influence exerted upon evaporation by sunshine duration, atmospheric humidity and atmospheric temperature is examined. Part 4 continues the forest meteorological observations of the previous studies but at a different location and for a different time interval. Extensive data on atmospheric temperature and relative humidity, evaporation and wind velocity are presented in graphical and tabular form. *Subject Headings:* **1. Forest microclimatology 2. Microclimatic data 3. Switzerland.**—*I.L.D.*

8D–65 551.577.52:551.588.6(47)

*Eitingen, G. R., **Zaderzhanie osadkov pologom lesa.** [Interception of precipitation by the canopy of forests.] *Les i Step'*, Moscow, 8:7–16, **1951.** 2 tables, 2 photos. **DLC**—Data are presented from one of the largest series of observations (1908–40) on interception. From 545 mm annual precipitation, observed in an open field, 32% was intercepted by a fir forest, 14% by pine, and 9% by birch. Data, including standard deviation, are given also for each season (for example the fir forest intercepts 15%, birch practically nothing in the winter). Another table shows the percentage of rainfall (May to Oct.) intercepted by the canopy, dependent on the intensity of the rain (fir: 70% for low intensity down to 20% for rainfall of high intensity). Fourteen percent more precipitation (39% in the winter) was observed in a clearing, than in the open field. (*Same item as* 5.4–191, April 1954, *MAB.*) *Subject Headings:* **1. Precipitation interception 2. Moscow District, U.S.S.R.**—*A.A.*

8D–66 551.588.6:551.521

*Kostin, S. I., **Osnovy meteorologii i klimatologii.** [Fundamentals of meteorology and climatology.] 2nd ed. Leningrad, **1951.** 146 figs. (some fold.), 8 tables, 25 refs. **DLC**—In Ch. 4, **Solar Radiation,** of this textbook for students of forestry or agriculture, a section on radiation in plant and forest covers gives the following data for total radiation in cal/cm² min in a 43 year old oak forest, in the Voronezh region, on a clear day in June 1939.

Hour	9	10	11	12	13	14	15	16	17
Forest	.11	.14	.11	.10	.11	.10	.08	.05	.04
Field	.74	.90	1.05	1.02	1.02	.85	.75	.56	.38
% of field	15	16	11	10	11	11	11	9	11

Other sections discuss influence of forest on temperature (p. 113–116), humidity (p. 134–7), evaporation (p. 141–2), precipitation and snow (p. 194–6) and wind (p. 220–222). (*Same item as* 4.4–8, April 1953, *MAB.*) *Subject Headings:* **1. Forest influences 2. Forest radiation 3. Solar radiation 4. Voronezh region, U.S.S.R.**—*M.R.*

8D–67 551.586:632.187:551.577.3

Rain that does not affect fires. *U. S. Forest Service. Northern Rocky Forest and Range Experiment Station, Hi-lites,* 3(13):3, July 1, **1951.** fig. **DA**—About one shower in three in the northern Rocky Mountain region produces too little rain to reach the surface under the forest cover. Another third of the showers produce too little rain to soak the fuel sufficiently to prevent spread of fire. A graph shows the percentage of interception of rain in relation to amount of precipitation per shower for all types of coniferous forests. For amounts <.25 in. >30% is intercepted. Showers up to .04 in. are completely intercepted. (*Same item as* 3.6–176, June 1952, *MAB.*) *Subject Headings:* **1. Precipitation interception 2. Fire weather conditions 3. Northern Rocky Mountains.** —*M.R.*

8D–68 551.577.52:551.579

Rowe, P. B. and Hendrix, T. M., **Interception of rain and snow by second-growth Ponderosa pine.** *American Geophysical Union, Transactions,* 32(6):903–908, Dec. **1951.** 3 figs., 2 tables, 6 refs. **DLC**—This paper reports the results of a six-year study to determine interception loss in a

fully stocked 65- to 75-year-old second-growth ponderosa pine stand situated near Bass Lake, California. Interception loss was computed as the difference between measured precipitation and the sum of measured throughfall and stemflow. The average annual precipitation was 47 inches, of which about 84 percent reached the forest floor as throughfall and four percent as stemflow. Twelve percent was interception loss. Throughfall, stemflow, and interception loss were directly related to storm size. Regression graphs and equations based upon this relation are given, which permit estimates of interception loss from storm precipitation. An average of four percent more precipitation reached the forest floor during snow than during rainstorms. The interception process is illustrated by rate graphs showing when and how interception loss occurred during a typical storm. Interception loss consisted principally of the water retained by the vegetation during its initial wetting plus that lost by evaporation from the vegetation during storm intervals without precipitation. (*Same item as* 3.11–205, Nov. 1952, *MAB.*) *Subject Headings:* **1. Forest soil moisture 2. Precipitation interception.**—*Author's abstract.*

8D–69 551.588.6:551.579.5

Sakharov, M. I. and Sakharova, N. M., **O vliianii eli na pochvu v lesu.** [Influence of spruce on the soil in forests.] *Pochvovedenie,* Moscow, No. 6:329–337, **1951.** 10 refs. **DLC**—Data obtained under various conditions of growth in a mixed forest are presented and discussed (air and soil temperature, snow, litter, frost, etc.). The microclimate under spruce (as opposed to other trees) is characterized by a lower degree of warming and cooling, lower air and soil temperatures, reduced evaporation, but also reduced soil moisture because of effects of interception of precipitation. *Subject Headings:* **1. Forest microclimatology 2. Forest soil moisture.**—*Forestry Abstracts.*

8D–70 551.577.52

*Takeda, K., **Rainfall in forest.** *Meteorological Society of Japan, Journal,* 2nd Ser., 29(6):199–212, June **1951.** 15 figs., 7 refs., numerous eqs. In Japanese; English summary p. 209–212. **DWB, DLC**—Author develops a formal equation for precipitation in a forest reaching ground directly or by dripping, that caught by crowns and that flowing down stem. Numerical results are calculated for various intensities of rainfall and are illustrated for spruce and beech. (*Same item as* 3.6–144, June 1952, *MAB.*) *Subject Heading:* **1. Precipitation interception.**—*C.E.P.B.*

1952

8D–71 551.584.4:551.524.4

Christy, Harlan R. (*Ohio State Univ.*), **Vertical temperature gradients in a beech forest in central Ohio.** *Ohio Journal of Science,* Columbus, 52(4):199–209, July **1952.** 4 figs., 9 tables, 8 refs. Abstracted from reprint. **DLC**—Measurements by means of recording thermocouples were made from May to Dec. 1950 at eight stations from 4′ below the forest floor to 80′ above it. Average vertical temperature gradients given for different hours of the day as well as maximum and minimum temperatures compared with those of microclimate. (*Same item as* 5.2–265, Feb. 1954, *MAB.*) *Subject Headings:* **1. Forest microclimatology 2. Vertical temperature gradient 3. Soil temperature data 4. Ohio.**—*A.A.*

8D–72 551.521:551.588.6 551.508.21

*Geiger, Rudolf (*ed.*), **Untersuchungen zum Wärme- und Wasserhaushalt junger Fichtenbestände.** [Investigations on the heat and radiation balance of young fir stands.] *Forstwissenschaftliches Centralblatt,* Berlin, 71(11/12):322–349, Nov./Dec. **1952.** 12 figs., 5 tables, 20 refs., 22 eqs. Contents: Mauerer, K., **Der Versuchsbestand.** [The experimental stand.] p. 324–330. Hofmann, G., **Ein Strahlungsbilanzmesser für forstmeteorologische Untersuchungen.** [A radiation balance meter for forest meteorological investigations.] p. 330–337. Baumgartner, A., **Die Strahlungsbilanz in einer Fichtendickung.** [Radiation balance in fir thicket.] p. 337–349. **DA**—The following papers in forest meteorology are introduced by Rudolf Geiger who briefly sketches the origin of forest meteorological research at the University of Munich subsequent to World War I and then describes the status of research in forest meteorology during and after World War II. K. Maurer's article is a description, with photographs and diagrams, of the location, vegetation and climate of the experimental stand. G. Hofmann's article deals with the physical principles and theory of the radiation balance meter; the description of the apparatus (with the aid of a diagram), the physical data of the instrument and its measurement errors. A Baumgartner's article contains a discussion of the elements of heat exchange of a plant stand, a description of the experimental procedure and apparatus for measuring the radiation balance of a fir stand and the numerical results which include the radiation balance above the stand at 10 meters, the radiation balance in the region of the canopy (4.1 meters), the radiation balance in the region of the tree trunks and radiation totals over a period of three years. *Subject Headings:* **1. Forest meteorology 2. Radiation balance**

meters 3. Radiation measurements 4. Fir trees. I. Mauerer, K. II. Hofmann, G. III. Baumgartner, A.—*I.L.D.*

8D–73 551.588.6(02)

*†Göhre, K., **Forstliche Wetter- und Klimakunde.** [Forest meteorology and climatology.] Berlin, Deutscher Bauernverlag, **1952.** 128 p. 39 figs., 48 tables, 42 refs. **DA**—An elementary textbook of descriptive meteorology designed primarily for students of forestry. The discussions of the meteorological variables, weather processes, etc., contain brief remarks on such topics as light and forest, effect of forest on soil and air temperature within the forest, water balance within the forest, the effect of wind upon plants, local climate and stand climate (with relevant numerical data or examples) and various injurious weather effects such as late and early frosts, droughts, forest fires, etc. *Subject Headings:* **1. Meteorology textbooks 2. Forest climatology.**—*I.L.D.*

8D–74 551.573:551.588.6

†*Mařan, B. and Lhota, O., **Studie o výparu v lese a bezlesí.** [Studies of evaporation in forests and in the open.] *Československa Akademie Zěmědelská, Prague, Sborník, Ser. B,* 25(2):61–82, **1952.** 8 figs., tables, bibliog., p. 80–81. Russian summary p. 81 82. **DLC**—Monthly precipitation and evaporation data obtained in a mountain and a flatland location in Czechoslovakia (1949–1951) are presented and discussed. They cover comparative measurements made on bare soil and in spruce, fir, pine and mixed stands. Differences between the values measured in the various exposures (precipitation retention by canopies, etc.) and their seasonal variations are graphically presented and discussed. The extensive list of references reviews the Czech and some of the foreign literature on evaporation and microclimatic forest influences. *Subject Headings:* **1. Forest hydrology 2. Precipitation interception 3. Evaporation data 4. Czechoslovakia.**—*G.T.*

8D–75 551.521:551.578.46:551.588.6

†Miller, David H., **Some forest influences on thermal balance over the snow pack.** Jan. 17, **1952.** 31 p. 5 figs., bibliog. p. 26–31. [Paper presented in Forestry Course 199, Fall 1951, University of California, Berkeley.] Typescript. **MH-BH.** Also issued as *U. S. Corps of Engineers. Snow Investigations, Research Note* (unnumbered), Dec. 15, **1952.** 37 p. 66 refs. **DWB**—Data on the transmission of radiation through forests of various trunk densities and through canopies of various densities, on interception of radiation and snowfall, on albedo of snowpack within the forest, on forest albedo, on heating of forest canopy by radiation, on long wave exchange between snow and canopy, etc., were collected from literature in forestry, botany and meteorology and particularly from reports (published and unpublished) of Cooperative Snow Investigations. An attempt was made to coordinate the material coming from various sources and the results are summed up and presented in graphical form. A bibliography of international literature containing 56 papers dealing with the subject is added. (*Same item as* 4.1–119, Jan. 1953, *MAB.*) *Subject Headings:* **1. Thermal balance of snow 2. Forest radiation 3. Albedo of snow 4. Forest snow pack.**—*G.T.*

8D–76 551.584.41 551.585:634.94

†*Richards, P. W., **The tropical rain forest: an ecological study.** Cambridge, England, Univ. Press, **1952.** 450 p. 19 figs., 39 tables, bibliog. p. 408–423. **DLC**—Chapter 7, **Microclimate,** in this comprehensive ecological study of the tropical rain forest deals with climate prevailing within the tropical rain forest beneath the tree canopy. With the aid of observational data, presented both in tables and in graphs, the author discusses air movement, interception of precipitation, air temperature, relative humidity, saturation deficit, evaporation, light penetration, atmospheric carbon dioxide, the influence of forest type upon microclimate and the physiology of the flora in relation to the microclimate. (*For abstract on whole book see* 4.11–12, Nov. 1953, *MAB.*) *Subject Headings:* **1. Tropical rain forests 2. Forest microclimatology 3. Rain forest climate.**—*I.L.D.*

1953

8D–77 551.584.41

Aulitzky, Herbert, **Forstmeteorologische Untersuchungen an der Wald- und Baumgrenze in den Zentralalpen.** [Forest meteorological investigations at the forest and tree limit in the central Alps.] *Archiv für Meteorologie, Geophysik und Bioklimatologie,* Ser. B, 4(3):294–310, **1953.** 4 figs., 5 tables, 13 refs. German, English, French summaries p. 294–295. **DLC**—Autographic records of temperature and humidity, and some evaporimeter measurements, in planted woods, thicket and in the open near tree limit at 1400–1900 m 10 km SW of Innsbruck, are described and illustrated. Even light woods have a much more uniform climate than open ground, conserving the soil and maintaining a moisture reserve especially valuable to young trees. The effect of general weather increases with altitude owing to more open vegetation. This and exposure to prevailing winds

overns the distribution of trees—larch, stone pine, spruce and, in depressions, alder thickets—which in turn affects the local climate, especially the evaporation. (*Same item as* 4.8–238, Aug. 953, *MAB.*) *Subject Headings:* **1. Forest influences 2. Austria.**—*C.E.P.B.*

8D–78 551.584.41

Cameron, Hugh, **Aerial environment of the forest.** *Royal Meteorological Society, Canadian Branch,* [*Publications*], 4(1):10–17, [1953]. 6 refs. **DWB**—A general purely qualitative discussion of the modifying effect exerted by the forest upon the individual meteorological variables to produce the special forest climate. The following subjects are considered: The influence of the forest upon radiation, illumination and air temperature, the vertical distribution of air temperature and relative humidity, the diurnal air temperature and humidity regimes, wind speed distribution within the forest, evaporation, the influence of a growing forest upon its own climate, etc. (*Same item as* 5.4–241, April, 1954, *MAB.*) *Subject Heading:* **1. Forest microclimatology.**—*I.L.D.*

8D–79 551.521.14

Dirmhirn, Inge, **Einiges über die Reflexion der Sonnen- und Himmelsstrahlung an verschiedenen Oberflächen (Albedo).** [The reflection of solar and sky radiation on different surfaces (Albedo).] *Wetter und Leben,* 5(3/4):86–94, May **1953.** 10 tables, 14 refs. **MH-BH**—Daily means of albedo for water surfaces, ice and snow surfaces, for green vegetation stands, for soil, sand and for rocks are given. The tables include data on albedo of global radiation for green fields and forests, albedo of a horizontal meadow near Vienna for every month of the year, etc. (*For fuller abstract see* 5.2–135, Feb. 1954, *MAB.*) *Subject Heading:* **1. Albedo of forests.**—*I.L.D.*

8D–80 551.525.4:551.588.6(757)

*Greene, Geoffrey E., **Soil temperature in the South Carolina Piedmont.** *U. S. Forest Service. Southeastern Forest Experiment Station, Asheville, N. C., Station Paper,* No. 29, Sept. **1953.** 16 p. 5 figs., 2 tables, 9 refs. **DWB**—Daily soil temperatures at depths of 2, 12, 18, 24, 26, 48, 60 and 72" are tabulated and averages shown on graphs for each month from Sept. 1950–Oct. 1951 for 4 sites in the Piedmont Section of South Carolina. One site was in a 58-year old mixed forest, one in 11-year old pine woods, one in a broomsedge field and one on a barren eroded area. There is a lag of 2 months in the maximum and minimum soil temperature compared with maximum and minimum air temperature, respectively. Under a heavy forest cover the annual range of soil temperature is less than under barren conditions. At 6′ depth the temperatures in Feb. do not vary with change of cover, but in Aug. it is 8° warmer under bare ground (74°) than under heavy cover (66°F). (*Same item as* 5.11–115, Nov. 1954, *MAB.*) *Subject Headings:* **1. Soil temperature data 2. Forest soil temperatures 3. Union, South Carolina.**—*M.R.*

8D–81 551.521.16:551.588.6:551.575

*Harada, Yutaka, **A study of sunlight forests on foggy days.** *Tokyo. Forest Experiment Station, Bulletin,* 64:170–181, Oct. **1953.** 8 figs., 6 tables, 5 refs. In Japanese; English summary p. 180–181. **DWB**—The amount of sunlight received in a forest, compared with that in the open, and the amount in dense fog compared with that on clear days, was observed and the results tabulated, shown graphically, and discussed. The type of tree makes a great difference—ranging from 3.2% in elm (*Ulmus*) forests to 7% in many other species and 38% for ash (*Fraxinus*). Reproduction was inhibited at 5% light intensity but flourishes at 30%. Fog increases the light intensity ratio in forests compared with outside. Results are given in g cal/cm². (*Same item as* 6.2–166, Feb. 1955, *MAB.*) *Subject Headings:* **1. Sunlight data 2. Light intensity in forests 3. Forest fog density.**—*M.R.*

8D–82 551.577.52

*Hoover, Marvin D. (*Piedmont Research Center, Union, S. C.*), **Interception of rainfall in a young loblolly pine plantation.** *U. S. Forest Service. Southeastern Forest Experiment Station, Station Paper,* No. 21, Jan. **1953.** 13 p. 8 figs., 2 tables, ref. **DWB**—In a 10-year old planting of loblolly pine near Union, S. C., the amount of rainfall reaching the ground by passing through the tree crowns and as flow down the tree trunks was measured. Regression equations for estimating the net rainfall, throughfall, and stemflow on the basis of rainfall in the open were determined. Net rainfall under the trees was found to average about 86 percent of rain in the open. A considerable proportion of rainfall reaches the ground as flow down the stems. The redistribution of rainfall due to this concentration of rain water at the base of trees is believed to be significant to tree growth and soil moisture. No seasonal differences in the proportion of net rainfall were found. Results apply only to precipitation occurring as rain. *Subject Heading:* **1. Precipitation interception.**—*Author's abstract.*

551.577.52:551.578.4

8D–83

*Kittredge, Joseph (*Experiment Sta., Berkeley*), **Influences of forests on snow in the Ponderosa sugar pine-fir zone of the Central Sierra Nevada.** *Hilgardia*, Berkeley, Calif., 22(1):1–96, Marc **1953.** 92 figs., 31 tables, 43 refs. **DWB, DLC**—This study aims at determining the sizes an densities of forests that are most effective in favoring the accumulation of snow, in minimizing loss by evaporation and in retarding and prolonging the melting period. The observations which con prise more than 20,000 records were made from Dec. to May or June for seven seasons (1934–38 an 1940–41) in the Stanislaus National Forest. Snow samples were taken at 100 stations equipp with composition boards, which were supplemented with 8-inch rain gages without funnels in eac of the ten different cover types. Evaporation was measured by means of aluminum pans. Tl data are presented by means of graphs, tables and regression equations. The data cover densit of snow, snow accumulation, interception, total snow on the ground, depth of snow density of tot snow, water equivalent of total snow on the ground, evaporation from snow, duration and disappea ance of snow cover and melting of snow. The suggestion, obtained from these studies, for improvi the amount and timing of the yields of water from snow are outlined. (*Same item as* 6.4–29 April 1955, *MAB.*) *Subject Headings:* **1. Forest snow pack 2. Central Sierra Nevada, Cal** —*I.L.D.*

551.586:595

8D–84

Lauscher, Friedrich, **Die Rolle mikroklimatischer Faktoren beim Massenauftreten von Wal schädlingen.** [The role of microclimatic factors in the mass manifestation of forest pests.] *Wett und Leben*, 5(11/12):195–200, Dec. **1953.** 2 figs., 5 tables, 3 refs. **DLC**—The mass appearan of the spruce moth (*Ocneria monarcha*) in the Alpine forests of Austria is attributed to the develo ment of a rather large phase difference between the moth and its parasites when the temperature the tree trunks where the moth eggs are laid rises more rapidly than that of the forest soil which the source of the moth parasites. This hypothesis is confirmed by studies of tree trunk and s temperatures, relationship of temperature to daily cloudiness variation and the relationship betwe spring weather during the years 1927–1953 and sunshine days. An abnormally long period of go weather, for example more than 10 days, with sunshine during a spring month especially when th are consecutive is an indicator of a possible disturbance of biological equilibrium. (*Same item* 6.3–327, *MAB.*) *Subject Headings:* **1. Forest entomology 2. Forest temperatures 3. Inse ecology.**—*I.L.D.*

551.575:551.588

8D–85

Sapporo, Japan. Hokkaido University. Institute of Low Temperature Science, **Studies fogs, in relation to fog-preventing forest.** Ed. by Takeo Hori. Sapporo, Japan, Tanne Tradi Co., **1953.** 399 p. figs., plates, tables, refs., eqs. **MH-BH**—A collection of 25 papers dealing wi the sea fogs occurring in southeast Hokkaido is the outcome of research carried out by the Institu of Low Temperature Science of Hokkaido University for the Forestry Section of Hokkaido P fecture which requested data on the role played by forests in capturing fog particles and thus acti as a fog barrier. The studies cover the mechanism of advection fog formation, the capture of f particles by the forest and the role of turbulence in this process, fog meter, liquid water content fog, electron microscopic studies of fog particles, etc. The papers will be abstracted individual (*Same item as* 5.6–207, June 1954, *MAB.*) *Subject Headings:* **1. Advection sea fog 2. Fog preventi 3. Atmospheric turbulence 4. Forest fog density 5. Fog particles 6. Japan. I. Hori, Takeo** (*ed* —*I.L.D.*

551.521

8D–86

Scheer, Georg, **Über Aenderung der Globalbeleuchtungsstärke durch Belaubung und Ho zonteinengung.** [Changes in global light intensity by foliage and horizon contraction.] *Wet und Leben*, 5(3/4):65–71, May **1953.** 2 figs., 5 tables, 19 refs. **DLC**—Measurements of glob light intensity and zenithal light intensity carried out in connection with phenological observati on birds indicated good agreement with earlier observation on zenithal light intensities but lov values for global light intensities. Differences in global light intensity depended upon differen in the location of the instrument in the vicinity of varying foliage. Analysis of the annual variati of global light intensity shows slight variation in "pine forest" but considerable variations in tensity in other locations. Quantitative analysis of the dependence of global light intensity up horizon obstruction and horizon elevation is carried out. (*Same item as* 5.2–130, Feb. 1954, *MA. Subject Headings:* **1. Solar radiation intensity 2. Phenological observations 3. Light intensities forests.**—*I.L.D.*

551.521.32:551.58

8D–87

*U. S. Corps of Engineers, **Radiation in forest at Willamette Basin Snow Laboratory.** *U. Corps of Engineers, Snow Investigations Research Note*, (unnumbered), June 1, **1953.** 17 p. 7 plat

5 tables, 12 refs. **DWB**—Under clear, warm, and calm weather conditions, observations were made at WBSL during 8–15 July 1952 to determine the effect of forest cover (ranging from 0.4 to 0.95) upon radiant heat exchange for use in snow hydrology research. For four snow patches (1000–2000 sq ft in size) over which measurements were made, the results indicated that the longwave radiation exchange was toward the snow, having an over-all average value of 0.11 ly/min for an average forest temperature of about 70°F. For bare-ground conditions, the longwave exchange was closer to zero. Inasmuch as the estimated value of longwave radiation exchange for snow in the open was 0.00 ly/min, the heat gain by the snow in the forest was primarily due to longwave radiation received from the trees. A linear relation appeared to exist between hemispherical forest cover and net longwave radiation, and, on this basis, a formula for estimating net longwave radiation as a function of forest cover and temperature was derived. Relationships between forest and cover and shortwave radiation could be estimated only roughly because attempts to determine ecliptic cover were unsuccessful. An average of results for six observational sites in the forest (four snow patches and two bare areas) indicated that about 15% of the incident shortwave radiation was transmitted through the trees; of this 15%, about two-thirds was direct sunlight and one-third diffused. Secondary effects of forest upon temperature, convective heat transfer, and snow-patch persistence were briefly considered. (*Same item as* 7.1–227, Jan. 1956, *M.A.B.*) *Subject Headings:* **1. Radiative exchange 2. Forest radiation 3. Albedo of snow 4. Willamette Basin, Oregon.**—*Author's abstract.*

8D–88 551.521:551.588.6

Yoshida, S. and Sato, Y., **On the insolation from the whole sky measured under apple trees.** *Journal of Agricultural Meteorology*, Tokyo, 8(12):29–30, March **1953.** 2 figs. In Japanese; English summary p. 30. Also their: **On the insolation from the whole sky in an orchard.** *Journal of Meteorological Research*, Tokyo, 5(6):507–509, July **1953.** 3 figs., table. In Japanese; English summary p. 507. **DWB**—Data on total sky radiation under apple trees and on open ground (April–Nov.) are graphically presented along with values of cloudiness, solar zenith angle and phenological development. *Subject Headings:* **1. Radiation under trees 2. Forest radiation.**—*G.T.*

1954

8D–89 551.584.41:551.578.46:624

Aulitzky, H., **Über mikroklimatische Untersuchungen an der oberen Waldgrenze zum Zwecke der Lawinenvorbeugung.** [On microclimatic investigation at the upper forest limits for the purpose of avalanche prevention.] *Wetter und Leben*, Vienna, 6(5/6):93–99, Aug. **1954.** 3 figs., 6 refs. **MH-BH**—In connection with the afforestation program initiated in the Tyrol to prevent avalanches, micrometeorological investigations were carried out in 1943 at a height of 1950 m above sea level. In this study the author describes the degree to which forest stands at this altitude influence individual climatic factors, the degree to which vegetation near the ground exerts an equalizing effect and the response of young woody plants to environmental influences. The microclimatic elements examined were temperature, wind, radiation and moisture. (*Same item as* 6.7-316, July 1955, *M.A.B.*) *Subject Headings:* **1. Forest microclimatology 2. Forest influences 3. Avalanche prevention 4. Tyrol, Austria.**—*I.L.D.*

8D–90 551.579.2:551.588.6

†Boyer, Peter B. (*U. S. Corps of Engineers, Portland, Ore.*), **Heat exchange and melt of late season snow patches in heavy forest.** *Western Snow Conference, Salt Lake City, April 1954, Proceedings*, p. 54–70, pub. **1954.** 8 plates, 20 refs., 18 eqs. **DWB**—Data on melting of remnants of snow in dense forests of Oregon at 4250 ft elevation obtained during a warm spell from July 7–15, 1952, are analyzed in great detail to show that 85% of the melt was due to air temperature and humidity and 15% to short-wave radiation. The 85% is due to long wave radiation (50%), convective heat exchange (20%) and latent heat of condensation (15%). A melt equation was derived as follows: $M = 60Qn$ 80 cm hr or $0.296Qn$ in hr where Qn is sum of effective heat components. (Revision and condensation of U. S. Corps of Engineers Res. Note 11.) (*Same item as* 7G-193, July 1957, *M.A.B.*) *Subject Headings:* **1. Heat exchange in forests 2. Snow melt in forests 3. Forest microclimatology 4. Willamette Basin, Oreg.**—*M.R.*

8D–91 551.584.41

Brooks, C. E. P., **The English climate.** London, English Universities Press, **1954.** 214 p. 27 figs., 6 tables, refs. **DWB**—p. 90–92 contain a brief qualitative description of the climate within a forest and the behavior of temperature, humidity and wind within it. Also the meteorological characteristics of a forest clearing are discussed. (*For abstract on whole book see* 5.11-1, Nov. 1954, *M.A.B.*) *Subject Heading:* **1. Forest microclimatology.**—*I.L.D.*

8D–92 551.577.52:634.9

Ovington, J. D., **A comparison of rainfall in different woodlands.** *Forestry*, London, 27(1):41–53, **1954.** 4 figs., 2 plates, 5 tables, 12 refs. **DA**—Adjacent forest plots at Bedgebury, Kent, were planted in 1929 32 with 11 different species, forming close canopies, with 3 open plots for control. Mean annual rainfall 33″. Rainfall and drippings under the trees and water flowing down trunks were measured and numbers of drops of different sizes counted; 25–68% of rain fell as drops larger than those in the open. Canopies retained 6–93% of rainfall. Yearly totals ranged from 77% under *Larix eurolepsis* to 46% for *Pseudotsuga taxifolia*. Flow of water down trunks was very small. Snowfall under deciduous trees in winter was up to 70% of that in open, under evergreens small or absent. (*Same item as* 7.10–59, Oct. 1956, *MAB.*) *Subject Headings:* **1. Precipitation interception 2. Bedgebury, England.**—*C.E.P.B.*

8D–93 551.584.41

*Papp, László, **A tarvágás hatása az erdö mikroklímájára.** [Influence of clear cutting on the microclimate of the forest.] *Budapest. Erdészeti Tudományos Intézet, Erdészeti Kutatások*, No. 1:45–54, **1954.** 24 figs., 13 refs. Russian, English and German summaries p. 52–54. **DLC**—In the region of the Körös River, in the Körösladány forest, the author investigated the changes in microclimate produced by clear cutting. The observations were made during one day in Aug. 1951 at two stations, one within an oak stand of medium age, the other within the clearing. The diurnal variations of temperature at the two stations are compared and the measurements are presented in graphs. *Subject Headings:* **1. Forest microclimatology 2. Forest clearings 3. Diurnal temperature variations 4. Körösladány Forest, Hungary.**—*I.L.D.*

8D–94 551.584.41:634.94

*Ross, R. (*British Museum of Natural History*), **Secondary succession in the Shasha Forest Reserve (Pt. 3 of Ecological studies on the rain forest of southern Nigeria).** *Journal of Ecology*, London, 42(2):259–282, July **1954.** 7 tables, 2 figs., 4 refs., 10 photos. **DLC**—In this study, the author examines the course of the secondary succession of cultivation in a primary rain forest area of southern Nigeria. CO_2 concentration, light intensity, air temperature and humidity at 0.6 m and 16 m above the ground were studied and the results are compared with those of EVANS for a primary forest. (*Same item as* 7.8–237, Aug. 1956, *MAB.*) *Subject Headings:* **1. Forest succession 2. Forest microclimatology 3. Southern Nigeria.**—*I.L.D.*

8D–95 551.577.52

Trimble, G. R. and Weitzman, Sidney (*Northeastern Forest Experiment Station, Forest Service U. S. Dept. of Agric., Upper Darby, Penna.*), **Effect of a hardwood forest canopy on rainfall intensities.** *American Geophysical Union, Transactions*, 35(2):226–234, April **1954.** 4 figs., 5 tables, refs. **DLC**—Ground rainfall intensities and throughfall were measured under a fully-stocked hardwood forest in West Virginia over a period of one year. Maximum 5- and 15-min intensities were compared with similar measurements made in the open. The results were analyzed separately for winter and summer conditions; that is, bare canopy versus canopy in full leaf. Regression equations were calculated for estimating intensities and throughfall under canopy from rainfall measurements made in the open. The study shows that low rainfall intensities are reduced more by summer canopy and high intensities are reduced more by winter canopy. Throughfall is reduced by canopy interception approximately the same amount in both summer and winter. (*Same item as* 6.5–241 May 1955, *MAB.*) *Subject Headings:* **1. Rainfall intensities 2. Precipitation interception 3. West Virginia.**—*Authors' abstract.*

8D–96 551.574.1:551.588.0

Zenker, H., **Waldeinfluss auf Kondensationskerne und Lufthygiene.** [Forest influence on condensation nuclei and atmospheric hygiene.] *Zeitschrift für Meteorologie*, 8(5):150–159, May 1954 9 figs., table, 5 refs. **DWB**—The author investigated the influence of non-foliated high forest, c pine forest and of a wooded area upon the condensation nuclei content of the atmosphere. Th nuclei count 50 m in front of the forest and at the forest edge diminishes by 27 to 45% and continue to diminish from the forest edge to 50 m within the forest by 20 to 39%. The decline in nucle count varies with the type of forest. (*Same item as* 6.7–253, July 1955, *MAB.*) *Subject Heading* **1. Forest influences on condensation nuclei.**—*I.L.D.*

1955

8D–97 551.525:551.588.

*Coutts, J. R. H., **Soil temperatures in an afforested area in Aberdeenshire.** *Royal Meteorological Society, Quarterly Journal*, 81(347):72–79, Jan. **1955.** 2 figs., 6 tables, 16 refs., 4 eqs. **DWB**—Observations were made with mercury-in-steel thermometers at 1, 6, 12 and 18 in. depth durin

1952–53 in a conifer forest (8–10 ft) on a slope near Ballater with soil stony loam below 1 in. of peat. Rainfall 833–733 mm/year, respectively. Weekly means of air and soil temperature are shown by curves. Mean annual temperatures are similar throughout the profile. Diffusivities are calculated from ratios of amplitudes air—1 in. and 1–6 in. Diurnal variation is very small below 6 in. It was found that reasonably good weekly means could be found from daily extremes. (*Same item as* 6.5 166, May 1955, *MAB.*) *Subject Headings:* **1. Forest soil temperatures 2. Aberdeenshire, Scotland.**—*C.E.P.B.*

8D–98 551.584.41(66)

*Kullenberg, Bertil, **Quelques observations microclimatologiques en Côte-d'Ivoire et Guinée Française.** [Some microclimatological observations on the Ivory Coast and on French Guinea.] *Institut Français d'Afrique Noire, Dakar, Bulletin, Ser. A.*, 17(3):755–768, July **1955.** 5 photos, 8 tables, 7 refs. **DWB**—Measurements of temperature and humidity in the layer of air near the ground were made in the tropical rain forest of Taï and on Mount Nimba and a nearby savannah at 1650 m and 500 m during a trip from the Ivory Coast and French Guinea, respectively, from Aug. 5 to Aug. 17, 1954. Temperature data at 5, 170, 600 and 1000 mm above the ground, and on a black surface, wind speed at 500 mm, cloudiness, etc. are reported for 7 runs of 1 to 10 hrs length. Forest and cloud influences and relation to plant and animal ecology are discussed. (*Same item as* 7.4–269, April 1956, *MAB.*) *Subject Headings:* **1. Forest microclimatology 2. Forest influences 3. Microclimatic data 4. Ivory Coast 5. French Guinea.**—*M.R.*

8D–99 551.578.46:551.582(794)

*†Miller, David H., **Snow cover and climate in the Sierra Nevada, California.** *California. Univ., University of California Publications in Geography*, Vol. 11, **1955.** 218 p. 11 figs., 78 5 tables, bibliog. p. 195–213. **DLC**—Chapter 3 in this monograph, entitled **"The role of open forest in the local climate,"** contains a discussion of the energy balance and micrometeorology of the forest as a distinct entity. The author discusses the transmission of insolation through the crown tops, reflection of insolation by the forest cover, absorption of insolation within the forest crowns, heat transfer from foliage by convection and transpiration, exchange of longwave radiation between crowns and snow, and influence of the forest on climate. (*For abstract on whole book see* 6.10–8, Oct. 1955, *MAB.*) *Subject Headings:* **1. Forest microclimatology 2. Climate over snow cover 3. Sierra Nevada, Calif.**—*I.L.D.*

8D–100 551.584.41:551.573

*Rowe, P. B. (*Calif. Forest and Range Exp. Station, Berkeley*), **Effects of the forest floor on disposition of rainfall in pine stands.** *Journal of Forestry*, Wash., D. C., 53(5):342–348, May **1955.** 6 figs. (incl. photos), 7 tables, 6 refs. **DWB, DLC**—Results of a series of experiments carried out in the forests of the Sierra Nevada near Bass Lake and North Fork, Calif. (Ponderosa Pine) and at Berkeley, Calif. (Monterey Pine), in 1941–45, by means of litter pans, lysimeters and moisture samples. The purpose was to measure evaporation from forest floors and their influence on runoff, percolation and evaporation from soil. Evaporation varied with depth of litter, deviation of snow cover and storm characteristics. Annual evaporation averaged 1.5″ from floor 1.0″ deep; 2.3″ from 2.7″ deep, 2.6″ from 3.6″ deep. Surface runoff was greater and percolation less from bare than from covered soils. Percolation starts sooner and lasts longer from covered soils. A floor ½″ deep is almost as good as for deeper floors, and much better than from lesser depths. (*Same item as* 7.2–253, Feb. 1956, *MAB.*) *Subject Headings:* **1. Forest hydrology 2. Evaporation from forest floors 3. Sierra Nevada, Calif.**—*M.R.*

8D–101 551.584.4:551.579.5

Schlüter, Heinz, **Ein Beitrag zur mikroklimatischen Differenzierung von Pflanzenstandorten.** [Contribution to the microclimatic differentiation of plant stands.] *Wetter und Leben*, Vienna, 7(5/6):114–122, **1955.** 2 figs., table, 6 refs. **DLC, DWB**—Microclimatic measurements for characterizing the continentality of stand conditions were made in grass and forest associations situated on soil independent of ground water. Extreme maximum and minimum temperatures of superficial soil layer measured at various intervals during the growing period provide adequate data on the differentiation of thermal conditions as a result of exposure and slope. The temperature characteristics of open grass stands and relatively dry forest associations of oak-hornbeam are presented. Measurements of the daily march of evaporation, and air and soil temperature reveal the differences in plant stands resulting from soil moisture content. (*Same item as* 7.7–241, July 1956, *MAB.*) *Subject Heading:* **1. Forest microclimatology.**—*I.L.D.*

8D–102 551.584.41

Wagner, Richárd, **A mikroklímák földrajzi elrendeződése Hosszúbércen.** [Geographic distribution of microclimates at Hosszúbérc.] **Beszémolók az 1955-ben végzett tudományos**

kutatásokról, 1955, p. 197–211 (issued as: *Hungary. Országos Meteorológiai Intézet, Hivatalos Kiadványai*, Vol. 20). 13 figs., table, 4 refs. Russian and German summaries p. 197–198. **DWB**—Preliminary results of temperature and sunshine duration measurements obtained in a microclimatological network in the Bükk mountains (Hungary) in spring and summer 1953 and 1954 are graphically presented. Effects of orientation and forest cover (with partly or fully developed foliage) on temperature and insolation values are analyzed. *Subject Headings:* **1. Microclimatic data 2. Forest influences 3. Hosszúbérc, Hungary.**—*G.T.*

1956

8D-103 551.521:551.588.6

†*Baumgartner, Albert, **Untersuchungen über den Wärme- und Wasserhaushalt eines jungen Waldes.** [Investigations of the heat and water balance of a young forest.] *Germany. Deutscher Wetterdienst, Berichte*, 5(28), **1956.** 53 p. 49 figs. (incl. photos.), 39 tables, 124 refs. **DWB, DLC**—This comprehensive and thorough study of the energy balance within a young forest is based upon meteorological observations carried out during the period 1951–53. Pt. 1 deals with the present status of research on the heat balance of a plant stand; it contains a discussion of energy balance through radiation, distribution of radiant energy in the stand, heat flow and the energy balance of the forest, methodology and experimental measurements of heat balance and the importance of heat balance studies in a forest, the science and practice of forestry. Pt. 2 is concerned with the field experiments in 1951–53 and contains a description of the experimental plot, the experimentation instruments and their disposition, the measurement periods, weather situations, etc. Pt. 3 presents the results of the measurements of the various meteorological variables namely, radiation intensity, air temperature, plant temperature, soil temperature, relative humidity, vapor pressure, equivalent temperature, dew, potential evaporation (Piche), soil moisture, wind velocity, roughness parameters and austausch coefficients. Pt. 4 presents the calculation of the heat balance elements; these include heat exchange within the total plant mass, heat exchange within the atmosphere of the plant stand, heat flux in the soil, heat exchange during plant metabolism, heat exchange during precipitation, the vertical heat flux in the atmosphere and the energy exchange during evaporation, transportation and dew formation and the energy balance. The paper contains extensive amounts of data and numerous photographs and diagrams. *Subject Headings:* **1. Forest microclimatology 2. Heat balance measurements 3. Heat exchange in forests.**—*I.L.D.*

8D-104 551.588.6:551.524.35

Miller, David H. (*Quartermaster Res. and Dev. Center, Natick, Mass.*), **The influence of open pine forest on daytime temperature in the Sierra Nevada.** *Geographical Review*, New York, 46(2): 209–218, April **1956.** 6 figs. (incl. photos), 3 tables, refs. **DWB, DLC**—The anomaly of high daytime temperature, long sequences of warm days and intense radiation in the Sierra Nevada is analyzed by considering the importance of regional landscape in a physical explanation of climate. Evidence is presented showing that the unusual warmth that characterizes the regional climate of the Sierra Nevada is caused by energy generated within the local environment. The local release of heat energy is attributed to the stands of evergreen. The radiation balance of this vegetation is analyzed numerically and it is concluded that the heat given off from the trees to the air is sufficient to account for the climatic anomaly. *Subject Headings:* **1. Forest influences on air temperatures 2. Temperature anomalies 3. Sierra Nevada.**—*I.L.D.*

8D-105 551.579.2:551.588.6

Rakhmanov, V. V., **Zavisimost' snegotaianiia v lesu ot kharaktera pogody.** [Dependence of snow melt in the forest on the character of the weather.] (In: Akademiia Nauk SSSR. Institut Geografii, **Sneg i talye vody ikh izuchenie i ispol'zovanie.** Moscow, **1956.** p. 112–124. 3 figs., 17 refs.) **DWB**—The author discusses the rate of snow melt in different kinds of forests in European Russia and presents data on snow melt rate. Rates of snow melting in forests and in the open country under different synoptic conditions are compared and differences in snow melt rate in forests are consolidated with particular weather features. The retarded snow melting in forests is explained in terms of the characteristics of the forest climate with its reduced illumination, retention of cold air, etc. *Subject Headings:* **1. Forest snow pack 2. Snow melting rate.**—*I.L.D.*

8D-106 551.578.46:551.579.4:634.94

Rosa, J. M. (*Hydrologist, U. S. Forest Service, Intermountain Region, Ogden, Utah*), **Forest snowmelt and spring floods.** *Journal of Forestry*, 54(4):231–235, April **1956.** 5 figs., 2 tables. **DLC**—This study which attempts to compute flood hydrographs from relationships developed for various physical factors influencing snow storage and melting contains graphs and data showing snow storage in forest and open areas in Idaho, Wyoming and Utah during 1949–1952, snow melt in forest and open, comparison of snow water content in forest plots and in the open for various

types of forests at different elevations, etc. *Subject Headings:* **1. Flood hydrographs 2. Forest snow pack 3. Idaho 4. Wyoming 5. Utah.**—*I.L.D.*

8D–107 551.578.46:551.588.6

Rutkovskiĭ, V. I., **Vliianie lesov na nakoplenie i taianie snega.** [Influence of forests on the accumulation and melting of snow.] (In: Akademiia Nauk SSSR. Institut Geografii, **Sneg i talye vody ikh izuchenie i ispol'zovanie.** Moscow, **1956.** p. 184–205. 2 figs., 5 tables.) **DWB**—A comprehensive study based upon numerous observations in European Russia on the regime of accumulation and melting of snow in forests as contrasted with that in open localities. In particular, the relationship between particular types of forests and snow accumulation and snow melt within them. Data are presented on the relative heights of snow cover within forests and in open localities, dependence of amount of snow accumulation beneath fir stands upon intensity of precipitation, relative duration of snow melt under fir trees and in open localities and snow accumulation and snow melt in pine, spruce, oak and small leaved forests and in open places. *Subject Headings:* **1. Forest snow pack 2. Snow melt in forests 3. European U.S.S.R.**—*I.L.D.*

SUPPLEMENTARY MATERIAL

8D–108 551.584.2:551.588.6

Burkhardt, Hans, **Lokale Klimaänderungen auf einem Berggipfel durch Kahlhieb.** [Local climatic changes on a mountain summit through deforestation.] *Angewandte Meteorologie*, 1(5):150–154, May **1952.** fig., 5 tables. **DWB**—An area of 20 ha on summit of Erbeskopf (Prussia), 816 m, was deforested in summer 1949. Observations 1940–44 and 1949–50, compared with Klein Feldberg (Taunus, 805 m) and Deuselbach (rainfall station), show that clearing resulted in a marked increase of wind force, a decrease of relative humidity and especially rainfall, and greater fog frequency in summer. (*Same item as* 3.9–210, Sept. 1952, *MAB.*) *Subject Headings:* **1. Forest influences 2. Deforestation**—*C.E.P.B.*

8D–109 551.584.41

[Unannotated list of supplementary references on forest microclimate.] This listing comprises items which have not been checked but are considered of sufficient importance to warrant inclusion by title and source.

(1) Aichele, H., **Beitrag zum Mikroklima eines Käferkahlschlages.** [Contribution to the microclimatology of a forest cutting.] *Wissenschaftliche Gesellschaft für Land- und Forstwirtschaft, Freiburg i. Br., Archiv*, No. 1:43–49, **1949.**

(2) Baumgartner, A., **Die Strahlungsbilanz in einer Fichtendickung.** [Radiation balance of a dense spruce forest.] *Forstwissenschaftliches Centralblatt*, 71:337–349, **1952.**

(3) Delfs, J., **Die Niederschalgszurückhaltung im Walde (Interception)** [Precipitation interception by a forest.] *Arbeitskreis "Wald und Wasser", Koblenz, Mitteilungen*, No. 2, **1955.** 54 p.

(4) Evans, G. C., **Ecological studies on the rain forest of S. Nigeria. II. The atmospheric environmental conditions.** *Journal of Ecology*, 27:436–482, **1939.**

(5) Gérard, Ph., **Une année d'observations microclimatiques en forêt seconaire à Bambesa (Uélés).** [A year of microclimatic observation in second-growth forest at Bambesa (Ueles).] *International Union of Forest Research Organizations, Congress, Florence*, 1954, *Compte Rendu*, p. 206–209.

(6) Gusinde, M. and Lauscher, F., **Meteorologische Beobachtungen im Kongo-Urwald.** [Meteorological observations in the Congo forest.] *Akademie der Wissenschaften, Vienna. Math.-Naturw. Klasse, Abt. IIB, Sitzungsberichte*, 150:281–347, **1941.**

(7) Kaempfert, W., **Einfluss der Pflanzenrichtung, -weite und -höhe auf die Besonnungszeit und -dauer.** [Effect of plant orientation, spacing and height upon time and duration of insolation.] *Zeitschrift für Meteorologie, Bioklimatische Beiblätter*, 10:148–153, **1943.**

(8) Koch, H. G., **Bestandstemperaturen eines bewaldeten Seitentales bei Jena.** [Stand temperatures of a forested side valley near Jena.] *Thüringer Landeswetterwarte, Mitteilungen*, Heft 7:69–98, **1948.**

(9) Linskens, H. F., **Niederschlagsmessungen unter verschiedenen Baumkronentypen im belaubten und unbelaubten Zustand.** [Precipitation measurements under various tree top types with and without foliage.] *Deutsche Botanische Gesellschaft, Berichte*, 64:215–221, **1951.**

(10) Umetani, H., **The microclimate of a coppice.** *Journal of Agricultural Meteorology, Tokyo*, 6:88–90, **1951.**

(11) Vaartaja, O., **Temperature and evaporation at and near ground level on certain forest sites.** *Canadian Journal of Botany*, 32:760–783, **1954.**

PART III. REVIEWS, TRANSLATIONS, REPRINTS, ROUTINE DATA PUBLICATIONS, AND ANALYTICS FROM RECENT SERIALS AND COLLECTED WORKS

Note: Material listed in these sections will not be included in the monthly indexes until abstracted. The item number is mentioned for those titles which have been abstracted in previous issues of **Meteorological Abstracts and Bibliography.**

A. REVIEWS OF IMPORTANT METEOROLOGICAL MATERIAL

Ahrens, L. H.; Rankama, Kalervo and Runcorn, S. K.: **Physics and chemistry of the earth, Vol. 1** London, Pergamon Press, 1956. 317 p. 8 tables. Price, 55 sh. Review by F. Steinhauser in *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 9(4):531–532, 1957.

Crowe, Percy Robert: **Wind and weather in the equatorial zone.** (In) *Institute of Geographers, Publications*, No. 17:23–76, 1951. 15 figs., tables, 48 refs. Review by H. Flohn in *Petermanns Geographische Mitteilungen*, Gotha, 100(4):298, 1956. (*For abstract on the original, see* 4I–225, Sept. 1953, *MAB.*)

France. Centre National de la Recherche Scientifique: **Les divisions ecologiques du mond** [Ecological divisions of the world]. Its *Colloques Internationaux*, No. 59, 1955. 235 p. numerous figs., table, numerous refs. Review by G. Schmidt in *Petermanns Geographische Mitteilungen*. Gotha, 100(4):298, 1956.

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